

**TRANSFORMATION FROM DEVELOPMENTAL MATHEMATICS  
STUDENT TO MATHEMATICS TEACHER:  
NARRATIVES OF ADULT LEARNING EXPERIENCES**

A Dissertation

by

GARY L. WRIGHT

Submitted to the Office of Graduate Studies of  
Texas A&M University  
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

December 2008

Major Subject: Curriculum and Instruction

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December 2008

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## **ABSTRACT**

Transformation from Developmental Mathematics Student to Mathematics Teacher:

Narratives of Adult Learning Experiences. (December 2008)

Gary L. Wright, B.S., The University of Tennessee;

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Chair of Advisory Committee: Dr. Gerald Kulm

The purpose of this study was to gain a better understanding of the experiences of developmental mathematics students who, after successful completion of their developmental courses, chose a career in teaching and to gain a better understanding of how those experiences helped shape their decision to go forward with a career in mathematics education. With the intention of exploring the text and the context of the experiences of former developmental mathematics students as they have reflected on them and storied them so as to make meaning of them, I determined that a qualitative methodology was indicated; and the qualitative method selected was narrative analysis.

Altogether 13 respondents met the criteria and were interviewed. Interviews conducted during the spring and early summer of 2008 were recorded, transcribed, and analyzed for data relevant to the goals of this study. Analysis revealed that developmental mathematics students not only have the capacity to become competent students but they have the potential of becoming outstanding teachers and scholars. This potential is closely tied to affective qualities, such as self-efficacy, which are often profoundly impacted and enhanced by a teacher or mentor. The developmental student

who has chosen a career in education frequently views the teacher/mentor as (i) a role model who he/she desires to emulate thereby extending that profound impact, and/or as (ii) a hero for whom future endeavors are viewed as a form of payback. The narratives also revealed that women developmental students typically had greater struggles and difficulties in meeting their educational goals because they bore the responsibility for caring for children and, in most cases, for their family's financial support.

Areas of study that warrant further investigation were uncovered while doing this research and include (i) an identification of teaching methodologies that both enhance mathematics capability and also bring a greater self-awareness of the increased capability, (ii) a determination of the impact of faculty/institutional behaviors and attitudes on adult developmental mathematics students who dropped out of their programs and did not complete their college education, (iii) the characteristics of the educational experiences of single mothers who passed through developmental mathematics and on to the teaching profession, and (iv) a deeper understanding of the teacher recruitment potential of cooperative learning groups, tutoring centers, and supplemental instruction.

## DEDICATION

For Robin Redmon Wright—It has always been obvious to all that you were the only one who could get me to think deeper, reach higher, and hold tighter to life than I ever would have alone. No writer possesses words as moving as yours—an emotional thrill ride every time I read the tales you know I cherish. You reawakened a love of language that I'd almost let slip away. It's no wonder I love a good story. And it's no wonder I love you.

## THREE SHADOWS

I looked and saw your eyes  
In the shadow of your hair  
As a traveler sees the stream  
In the shadow of the wood;  
And I said, "My faint heart sighs  
Ah me! to linger there,  
To drink deep and to dream  
In that sweet solitude."

I looked and saw your heart  
In the shadow of your eyes,  
As a seeker sees the gold  
In the shadow of the stream;  
And I said, "Ah me! what art  
Should win the immortal prize,  
Whose want must make life cold  
And Heaven a hollow dream?"

I looked and saw your love  
In the shadow of your heart,  
As a diver sees the pearl  
In the shadow of the sea;  
And I murmured, not above  
My breath, but all apart,—  
"Ah! you can love, true girl,  
And is your love for me?"

—Dante Gabriel Rossetti (1828-1882)

## ACKNOWLEDGEMENTS

I want to offer my deepest gratitude to those individuals who have made it possible for me to conduct this study. First, there is my committee chair, Dr. Gerald Kulm, whose incredible insight and ability to get to the heart of a matter never ceased to amaze me. The value of his patience, his challenges, and his assistance cannot be overstated. And thank you to Dr. Carolyn Clark who introduced me to whole new worlds via qualitative inquiry and narrative analysis. What a friend! Special thanks to Dr. Stephanie Knight and to Dr. Robin Autenrieth—whose input, perceptiveness, and guidance were all incredibly valuable. I say with all sincerity that I cannot imagine a better advisory committee than the one that looked out for me. Thank you, all.

I want to thank the participants in this study. These exceptional individuals shared stories that were equally exceptional and engaging. It is my earnest desire that the result of our joint effort will bring them an even greater reward for their willingness to share their provocative and emotional stories.

I owe a special thanks to my family members who supported my efforts to carry out this work. I especially want to thank the three women who have loved me unconditionally through it all: my mother—Sue Newman Pierce, my sister—Tinina Westbrook, and my wife—Robin Redmon Wright, the love of my life. And I also want to thank two young men whose support and encouragement have meant so much: my son, Benjamin, who is always genuinely happy for my successes, and my grandson, Kaidyn, whose love of learning *new numbers*, even at age three, was contagious and filled my life with hope and laughter.

I would like to express my appreciation for the encouragement and support I have received through the years from many other friends and family members including my other children—Gabriel, Alex, and Aubrey—my brothers-in-arms—David Powell, Richard Townsend, Aaron Tallent and Tommy Carter—and my early mentors—Dr. Donald J. Dessart and Dr. Robert M. McConnel, both from the University of Tennessee.

Finally, I want to acknowledge the profound impact on my life of Dr. Irene P. Millsaps, my algebra I and geometry teacher at Copper Basin High School. More than anyone else, Dr. Millsaps was instrumental in showing me the beauty of mathematics and in providing the kind of high quality mathematics instruction that can change the course of one's life. Thank you, Ms. Millsaps. You are truly missed.

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## CHAPTER I

### INTRODUCTION

*“They’re all f\_\_\_ing idiots! They’ve got no business being in college – none of them!” declared the teacher as we began our deliberate walk down the second-floor hallway and toward the stairs that would take us up one floor to the seclusion of the mathematics department faculty offices. We had met in the middle of the hallway, not on purpose, but because we had each just exited a mathematics classroom on opposite sides of that crowding hallway and because I had offered something of a rhetorical greeting saying, “So, how was your first day of class?”*

*Being acutely aware that we were still within earshot of his meandering students (and mine), I cleared my throat, dusted off imaginary remnants of chalk dust and quickened my step staring squarely ahead at the stairwell doors. I tried, with no success, to change the tone by observing, “Well, some students do have a slow start sometimes, but I’m sure you’ll have them digging in with eager minds in no time.” I should have saved my breath. The expletives and well-rehearsed tirade that accompanied us down the hall and up the stairs need not be repeated here. It did provide some insight, however, into why so few students ventured up to the third floor to seek additional help from their mathematics instructors, and why the pass rates for developmental mathematics courses at this university hovered around an abysmal ten to fifteen percent. And, of course, the persistence rates from the second year on through to*

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This dissertation follows the style of *Journal for Research in Mathematics Education*.

*graduation for developmental students declined each year with the latter approaching zero.*

I had been asked, as a former member of that mathematics department, to help out with a course or two because of the shortage of qualified mathematics teachers. I was happy to do so since I had transferred four years previously to the university's education department and had been teaching K-4 methods courses. I knew that I'd enjoy the change of pace. The teacher, let's call him Dr. Zero, with whom I was becoming acquainted, had joined the mathematics department in the interim since I had departed and his lecture on the nature of developmental students was serving as our introduction. He, like me, was one of only four full-time faculty members who taught developmental mathematics. The majority of the developmental courses were taught by adjuncts and by graduate students.

In this mid-sized southern university, as in many open-door universities and community colleges all across the US, developmental courses make up the bulk of the mathematics department's offerings. Yet, the developmental courses are seldom taught by tenured or full-time faculty, but instead by untrained faculty, adjuncts, and graduate students who are ill-equipped to teach mathematics to adult college students. For example, as indicated earlier, Dr. Zero, whose degrees were in science, had transferred into mathematics from another department two years prior to our meeting. It seems he had found himself in an irreconcilable conflict with his own department chair, as well as with other members of that department including students as well as faculty. He had been offered an "out" by means of an inter-institutional transfer to the mathematics

department. His interpersonal skills, with faculty or with students, had not improved much since the transfer, but the pressing need for mathematics teachers afforded him a measure of job security in spite of his contentious personality.

The quality and amount of training of those who teach developmental courses (in comparison to those who teach non-developmental courses), the high cost of developmental education, the stigma associated with having pre-college courses being taught in college, and the dismal success rates of developmental programs are all interrelated issues. Moreover, these factors help insure developmental education remains controversial and hotly debated (Boyer, Butner, & Smith, 2007; Bahr, 2008; Merisotis & Phipps, 2000). That the value of developmental education is sometimes questioned is not surprising when one considers that the story of Dr. Zero is played out, with variations, at numerous colleges and universities around the country.

A report to the New York State Board of Regents included information about developmental education across the nation as well as in New York (Remedial Education, 1999). At the time of this study 3,060 institutions of higher learning (both public and private) were identified as those that accepted freshmen students. It was found that 72 percent of higher education institutions enrolling freshmen offer remedial (or developmental) courses in mathematics. Developmental education is a large and *growing* part of higher education in the United States. Although, developmental education is offered extensively, it is not always offered well. There are wide variations in the design, as well as in the quality, of what passes for developmental education and these variations, of course, impact the wide variety of views held toward the discipline.

New York's Remedial Education report accurately points out that the nature of developmental education programs varies from institution to institution (Remedial Education, 1999). For some schools there are non-credit refresher courses only. At other institutions the developmental education program might include supplemental instruction (SI), mandatory advising, counseling, tutoring, and tracking. Some even include grouped housing with in-room computer-based learning assistance and the coordinated development of specific study skills. For their purposes New York's study defines remedial (or developmental) education "as encompassing those courses and support services in basic academic skills which address the needs of a diverse population of underprepared students ... for which no college credit is awarded."

It should be noted that the academic services provided for this particular population are identified by a number of common terms, with *remedial* and *developmental*, perhaps, being the most common. Other terms include *adult basic skills* and *college preparatory courses* among others. The term *developmental* will be used in this paper as it is consistent with the terms employed by the most prominent educators and researchers in the field including the National Association of Developmental Educators (NADE).

There are two points that warrant emphasis as we consider the extent and the nature of developmental education. First, as mentioned, developmental education is a large and growing segment of post-secondary education and, secondly, careful research has produced clear and convincing evidence that the design of effective and successful developmental programs is possible.

As for the scope of developmental education, each year approximately 30% of the new students entering U.S. public colleges and universities will need some form of remedial or developmental education (NCES, 2004; THECB, 2006; Gerlaugh, Thompson, Boylan, & Davis, 2007). Even with legislation requiring mandatory high-stakes testing across all 50 states, the 30% figure continues to inch upward. For the state of Texas, each year 41% of all new college students are not prepared for college-level work – and the rates are even higher for the minority populations of Latinos and African-Americans (THECB, 2006). With ongoing testing programs, with valiant efforts to coordinate transition programs connected to feeder high schools, with recalibration of entrance standards, and with many other efforts to “close the gaps”, these rates have remained virtually unchanged or else continued to creep upwards from year to year throughout the past decade. In particular, the often stressful (and expensive) emphasis in recent years on high-stakes testing and teacher-accountability has not solved the problem. Again this year Texas will have over 200,000 new college students who are unable to perform basic skills at levels needed for success in higher education (THECB, 2006).

Besides, developmental education classrooms are not being populated solely by individuals straight out of high school. On the contrary, with increasing globalization and the steady loss of American jobs, especially in the manufacturing and service industries, many under-prepared individuals are enrolling in higher education in order to expand their employment opportunities. So although we strive to reduce the actual number of high school seniors with deficiencies in reading, writing, and mathematics,



there remains a growing population of older, non-traditional students (including a significant immigrant population) whose educational backgrounds will never match contemporary curriculum designs, and for whom we must continue to provide educational opportunities to include developmental education.

Concerning the second point, that there are ways to make developmental education work, it must be said that the critics of developmental education should not be dismissed out-of-hand. When they complain that developmental education forces the taxpayers to pay double for the same education, their complaints are not without merit and, therefore, must be taken into account. To expect fiscal responsibility from the state's educational system is certainly reasonable. And it is reasonable to expect that we continue to make progress at all levels of education. Real and lasting improvement in elementary, middle, and secondary school programs is a goal that can and must be reached. Remediation is indeed a poor substitute for preparation. That the developmental education requirements of entering freshman can be reduced has been demonstrated by California State University (Cal State Remedial Report, 1999). CSU showed that by developing close working partnerships with the local high schools, with determination and creativity, that hard work can pay off and that it may be possible to begin to reduce the need for developmental education, especially among traditional-aged college freshmen. Although, as noted earlier, the need for developmental education could never be entirely eliminated, however by doing it right we go a very long way toward silencing the critics and demonstrating to the public that they are indeed getting their money's worth. An effective, cost-efficient developmental education program is attainable and

worthy of the respect of the community. Nonetheless, we may have to resign ourselves to idea that both the need for developmental education and its critics will be with us in perpetuity for, as Brier (1984) observed, “It can be asserted accurately that bridging the academic preparation gap has been a constant in the history of American higher education and that the controversy surrounding it is an American educational tradition” (p. 2).

Still, researchers in the field have dedicated themselves to identifying the key components of successful developmental programs. Research has shown that decisions about class size, teacher qualification, attendance requirements, availability of academic support services, advising, counseling, and a number of other factors all have significant impact on the ultimate success of individual students as well as developmental programs. In fact, an April 2005 report to the Texas Higher Education Coordinating Board entitled “Developmental Education in Texas Higher Education” compared policies and practices of Texas public higher education institutions as they evolved over the four-year period from 2000 to 2004 (THECB, 2005). The report indicated that it borrowed heavily from the work of Dr. Hunter Boylan, Director of the National Center for Developmental Education, who has conducted a number of studies for the Coordinating Board. In particular, the Coordinating Board indicated their reliance on Boylan’s (2002) research included in *What Works: Research-Based Best Practices in Developmental Education*.

Educational institutions, in Texas and elsewhere, that have adopted best practices as identified by developmental researchers, like Boylan, have seen marked improvement in the quality of their programs. The results of one encouraging study conducted by

Gerlaugh, Thompson, Boylan, and Davis (2007) suggest that practitioners are beginning to consult available developmental education literature and research as they design their programs and that the “utilization of research-based best practices such as mandatory placement, program evaluation, support services, and decreased use of adjuncts is increasing among developmental programs at U.S. community colleges” (p. 4).

The emergence over the past 30 years of professional organizations and professional standards has helped raise public awareness and improve public perception of developmental organizations. More importantly, the practice of developmental education has been improved, generally, and its practitioners have been enriched and guided by leaders and key researchers in the field via the National Association of Developmental Educators (NADE) and the National Center for Developmental Education (NCDE). Key publications such as the *Journal of Developmental Education* and *Research in Developmental Education* have served as disseminators of cutting-edge research as well as guides for how the research might best inform the practice.

The basis for my interest in developmental education, and in developmental mathematics, in particular, is encapsulated in the official description offered by the National Association of Developmental Educators (NADE):

Developmental education is a field of practice and research within higher education with a theoretical foundation in developmental psychology and learning theory. It promotes the cognitive and affective growth of all postsecondary learners at all levels of the learning continuum. Developmental education is sensitive and responsive to the individual differences and special

needs among learners. Developmental education programs and services commonly address academic preparedness, diagnostic assessment and placement, development of general and discipline-specific learning strategies, and affective barriers to learning (NADE, 1995).

The word *affective* appears twice in the above statement—*affective* growth and *affective* barriers. In the black-and-white world of mathematics it is sometimes easy to lose sight of the affective components of the learning process. But it is a concern for just these components that generated the impetus for this research.

### **Statement of the Problem**

The direction of this study sprang from research needs as identified by a leading researcher in the field of developmental education, the aforementioned Dr. Hunter Boylan. The outcomes of a 1999 meeting of developmental educators were published in the *Proceedings of the First Intentional Meeting on Future Directions in Developmental Education* (2000). An article titled “Research in Developmental Education: What Do We Need to Know” was summarized by Boylan (2000). Boylan emphasized that while some characteristics and some demographics of developmental students are known, much more knowledge is still needed. For example, it is known that developmental students are much like all other students and that “the only thing that typifies them is that they are over-represented among the poor and that many have a past history of academic difficulty” (p. 23). In particular, the THECB (2006) report reveals that Hispanic and African-American students are overrepresented among those students who are under-

prepared for college work in Texas. Statewide, 41% of all students transitioning from high school to college are in need of remediation. This group is comprised of 54% of the Hispanic students, 54% of the African-American students, and 32% of the White students. Furthermore, as is commonly reported, once in college, minorities exhibit persistence rates that fall below those of the general student population.

Apart from such demographic information, there is need for more knowledge of developmental students' characteristics and experiences, as well as a greater understanding of the implications of such for instructional practice. For instance, we need "to learn more about the impact of faculty attitudes on the performance of weaker students" (Boylan, 2000, p. 23). In particular, to what extent do the attitudes and behaviors of faculty contribute either to the success or failure of developmental students? To what extent do they contribute to the recognized stigmatization and resulting low self-esteem of developmental students and to what extent do they contribute to improvements in student self-esteem? Mathematics, especially, is the subject that, for many students, brings the issues of self-esteem and confidence to the forefront. So we need to know if educators are exhibiting attitudes and behaviors, either consciously or unconsciously, that serve as obstacles and barriers, or, alternatively, as propellants and bridges, for developmental mathematics students in their efforts to navigate the waters of higher education.

Developmental education researchers have responded to calls like Boylan's and have begun assisting us in getting know our students better and in teaching them better (Goldschmidt, Notzold, & Miller, 2003; Wright, Wright, & Lamb, 2002; Hammerman,

2003; Hall & Ponton, 2005; Arendale, 2002). Such studies have detailed the demographics of those entering developmental programs, determined the persistence rates, and examined programs and institutional policies. The characteristics of exemplary programs have been analyzed and sets of best practices have been identified, compiled, and disseminated. When the available research informs our practice then our programs are improved as are the educational experiences of our students. Such success is significant, but to the impassioned, idealistic, and devoted developmental educator, such success remains meager. We can, and we simply must, do better.

This study began with the broad objective of discovering more about developmental (mathematics) students especially in relation to the affective components of teaching and learning. Having determined that much could be learned from case studies and life stories, a qualitative study involving narrative analyses was deemed appropriate. An exciting feature of such qualitative studies is, as Schwandt (1997) points out, that “fieldworkers routinely adjust their inquiry plans and strategies in response to what they are learning” (p. 34). This planned responsiveness to the unfolding study is sometimes referred to as an *emergent design*. In this case, as the study unfolded, it became advantageous to refine the inquiry, focusing on a particular group of students who were well-positioned to shed light on developmental mathematics education – those who were, themselves, actively pursuing careers in education. That decision, it turns out, served to strengthen the applicability of this research.

### **Statement of Purpose**

The purpose of this study was to gain a better understanding of the experiences of developmental mathematics students who, after successful completion of their developmental courses, chose a career in teaching and to gain a better understanding of how those experiences helped shape their decision to go forward with a career in mathematics education.

### **Research Questions**

This study sought to explore the experiences of particular developmental mathematics students with respect to the general institutional climates, the culture of higher education, elements of the broader culture in general, issues related to self-efficacy and success with mathematics, and other contributors peculiar to the individual participants. The research questions that defined and guided the study were:

1. What do former developmental mathematics students, who ultimately chose careers in mathematics education, identify as primary contributors to their success in mathematics and how has their experience in developmental mathematics shaped their career?
2. What impact did faculty/institutional behaviors and attitudes have on these adult developmental mathematics students?
3. What more can be learned about the educational experiences of the participants that can inform future research and practice?

It is important that we, adult developmental mathematics educators, investigate such issues because it is our responsibility to learn more about our students and their experiences. We must do so in order to improve developmental mathematics instruction, address issues of academic preparedness, develop effective learning strategies, and begin eliminating some of the barriers to their participation in, and their contribution to, mathematics education.

### **The Professional Significance of the Study**

It was determined that a narrative analysis of their stories held the promise of gaining insight that would, in turn, assist developmental educators in getting to know their own students better and assist them in helping their students overcome academic deficiencies. Moreover, as shall be seen, this study generated the unexpected benefit of revealing areas of possible future research into the identification and encouragement of potential mathematics teachers. As developmental educators we are encouraged by even marginal improvement, though we yearn for dramatic improvement. It is good when a developmental mathematics student completes a course. It's even better when he/she completes the developmental program and, subsequently, succeeds in his/her college-level mathematics course(s). Of course, it is an understatement to say we are delighted when a developmental student persists to graduation. We are even more delighted if a developmental student decides to major in mathematics or a mathematics-related field. Rarest and most gratifying of all is when a developmental mathematics student graduates and decides to become a mathematics educator. It is reminiscent of the well-known



proverb, “Give a man a fish – you have fed him for today; teach a man to fish – and you have fed him for a lifetime” and it is particularly gratifying because it speaks to the perpetuation of success beyond the immediate. It is imperative that we not only teach our particular content, mathematics in this instance, but that we perpetuate that which is good and successful beyond ourselves. I can imagine no greater reward as a teacher than knowing that not only have I taught my own students, but that I, through them, will teach untold numbers of others.

Some of the brightest, hardest-working, and most creative individuals I know were once developmental mathematics students. Personal acquaintances of mine who did not participate in this study, for any number of reasons, include the dean of a science division at a very large community college, a prominent and well-published researcher in adult literacy, and three PhDs with degrees in adult education, mathematics, and mathematics education, respectively. Another acquaintance is a mathematics department head at a mid-sized university. Numerous others *only* have bachelor or master degrees in areas ranging from psychology to business, from forestry to chemistry, and from English to astronomy. These individuals *all* belonged in college and *none* of them is a “*f\_\_\_ing idiot!*” The real question is whether Dr. Zero belongs in a college classroom. I think the answer to that question is obvious, but should any more evidence be required I would have to follow Fermat’s lead and say, “I’ve found a remarkable proof..., but there is not enough space...to write it” (Boyer, 1991; Edwards, 1977).

## **CHAPTER II**

### **LITERATURE REVIEW**

According to Glatthorn (1998) it is a time-honored tradition of doctoral research to acknowledge indebtedness to the past – to the researchers, to the practitioners, and to their collective work. After recalling that Isaac Newton credited his vision and foresight to the work of his predecessors saying, “If I have seen farther than others, it is because I have stood on the shoulders of giants,” Steen (1990) emphasizes that “those who develop mathematics curricula for the twenty-first century will need similar foresight” (p. 7). In acknowledgement of that need, what follows is an overview of the history, research, and developments in areas relevant to this developmental mathematics education study. These are presented, not solely for the sake of tradition, but rather in hopes also of attaining a superior vantage point, a clearer perspective, and a glimpse of where we must go next and, yes, how we are to get there.

#### **Developmental Education – The First 200 Years**

Like a tag-along little brother, developmental mathematics has shadowed the mainstream mathematics curricula for many years and through many metamorphoses. Developmental education is not, as many suppose, a new phenomenon, though it has grown in the public conscientiousness significantly over the past 30 years. A broader public awareness, the inclusion in political debate and controversy, the emergence of related professional organizations, and a body of research literature have all contributed to this increased awareness. Nevertheless, as Brier (1984) has asserted, “bridging the

academic preparation gap has been a constant in the history of American higher education” and, furthermore, “the controversy surrounding it is an American educational tradition” (p. 2). Indeed, as far back as the 1700s Harvard was admitting underprepared students who, subsequently, required tutoring in Latin and Greek (Stephens, 2003). Later, in 1849, the University of Wisconsin was the first to establish a preparatory *department* for underprepared students who needed additional instruction in academic areas that were typically the purview of secondary schools (Stephens, 2003; Arendale, 2002).

Of course, even now, not every student emerges from the K-12 experience totally prepared for college-level work. This is quite troubling for many people – faculty, administrators, politicians, parents, and other members of the public including, of course, the student himself or herself. From time-to-time this fact of life gets increased attention as someone makes a political issue of it. Yet, as Maxwell (1979) has observed, we have, “always had academically weak, poorly prepared college students. Perhaps we have them in greater numbers today; but then, more students are currently attending college than ever before” (p. 5). Furthermore, as mentioned earlier, they are not all coming to college straight out of high school. Immigrants, veterans, mothers, homemakers, and many others are enrolling in college having, often of necessity, postponed doing so directly upon graduating high school.

However, it was the predominantly white male students who attended the predominantly religious colleges in our nation’s early years – schools such as Harvard, Yale, William and Mary – and these young men were, more often than not, preparing for

the ministry. Their (usually) privileged upbringing, which likely included private tutors and/or preparatory home-schooling, could be easily supplemented with tutoring in Latin and Greek once they arrived at college if such were needed. However, in the 19<sup>th</sup> century, curriculum and education requirements began to change, becoming more rigorous. Simultaneously, more students were enrolling with insufficient academic preparation and the nature of their insufficiencies was becoming more varied (Stephens, 2003; Arendale, 2002). Colleges addressed the problem by offering courses or tutoring, in some form, to enhance academic skills. As mentioned earlier, the University of Wisconsin provided preparatory education by means of a *department* which it ran for that particular purpose from 1849 through 1880, a department that remained controversial throughout its existence.

By the middle of the 19<sup>th</sup> century, legislation, such as the Morrill Acts (1862 & 1890) and the Hatch Act (1887), opened up education for many more Americans by facilitating the establishment of agricultural and mechanical colleges, by prohibiting various forms of discrimination in exchange for federal funds, and by making access to education generally more widespread and affordable. This same period also saw the emergence of additional private colleges as well as some of the first degree-granting women's colleges, such as Wesleyan in Macon, Georgia (Stephens, 2003; Casazza 1999; Arendale, 2002). Naturally, the diverse backgrounds of all these individuals meant even greater variation in the quantity and quality of their academic backgrounds. College preparation, or the lack thereof, continued to be an issue and it continued to be addressed by various *ad hoc* means (Brubacher & Rudy, 1976; Stephens, 2003).

By the late 1800s nearly 80% of colleges provided some form of college preparatory program with roughly 40% of entering freshmen in need of such programs – a figure quite similar to our figures for the first decade of the twenty-first century (Arendale, 2002; Stephens, 2003).

By the turn of the century the recommendations of the Committee of Ten, first established in 1892, began to bring a degree of uniformity to the curriculum in the nation's schools. The Committee of Ten sought to determine a curriculum for grades 1 through 12 that would meet the needs of both the college-bound student and the terminal student. Colleges hoped that setting higher and more uniform standards for both students and teachers in elementary and secondary schools would insure that those who attended college would be adequately prepared. It didn't work out that way. In fact, in 1907, in spite of the higher standards, the *majority* of students entering Harvard, Yale, Columbia, and Princeton did not meet the entrance requirements (Stephens, 2003). By 1915, a report to the U.S. Commissioner of Education indicated that 350 of the nation's colleges had preparatory departments – the forerunners of developmental education departments (Stephens, 2003; Casazza, 1999; Arendale, 2002).

General education courses, academic advising, study skills programs, and the birth of community colleges offering certificates and associate degrees came about as a result, in large part, through efforts to bridge the gap between secondary and collegiate education. Even though the search for the one best system for American education continued, yet it remained elusive. Necessary and prevalent, that which is now called developmental education persisted as a very real part of the US educational system.

From its dawning until its closing, the twentieth century was one filled with the catalysts of change. From its earliest years, the century brought rapid industrialization, economic growth and opportunity, war, depression, massive immigration, women's suffrage and other movements, advances in transportation and communication, new medicines, and a myriad other societal factors that screamed of the importance of education. Change was accelerating and more people attended college.

By the 1940s there was more war, followed by a G.I. Bill that resulted in even more college enrollees. Industry needed skilled workers. Open admission policies, Civil Rights, and second-wave feminism meant even greater numbers of Americans sought educational opportunities. The times were changing. Billy Joel sought to capture the essence of the period with his song, *We Didn't Start The Fire*:

1949	Harry Truman, Doris Day, Red China, Johnny Ray South Pacific, Walter Winchell, Joe DiMaggio
1950	Joe McCarthy, Richard Nixon, Studebaker, Television North Korea, South Korea, Marilyn Monroe
1951	Rosenbergs, H-Bomb, Sugar Ray, Panmunjom Brando, The King and I, and The Catcher In The Rye
1952	Eisenhower, Vaccine, England's got a new queen Marciano, Liberace, Santayana goodbye

Chorus:    We didn't start the fire  
                   It was always burning since the world's been turning  
                   We didn't start the fire  
                   Well, we didn't light it, but we tried to fight it

1953	Joseph Stalin, Malenkov, Nasser and Prokofiev Rockefeller, Campanella, Communist Bloc
1954	Roy Cohn, Juan Peron, Toscanini, Dacron Dien Bien Phu falls, Rock Around The Clock
1955	Einstein, James Dean, Brooklyn's got a winning team Davy Crockett, Peter Pan, Elvis Presley, Disneyland

- 1956 Bardot, Budapest, Alabama, Khrushchev  
Princess Grace, Peyton Place, Trouble in the Suez
- 1957 Little Rock, Pasternak, Mickey Mantle, Kerouac  
Sputnik, Chou En-Lai, Bridge On The River Kwai
- 1958 Lebanon, Charles de Gaulle, California baseball  
Starkweather homicide, Children of Thalidomide
- 1959 Buddy Holly, Ben Hur, Space Monkey, Mafia  
Hula Hoops, Castro, Edsel is a no-go
- 1960 U-2, Syngman Rhee, payola and Kennedy  
Chubby Checker, Psycho, Belgians in the Congo
- 1961 Hemingway, Eichmann, Stranger in a Strange Land  
Dylan, Berlin, Bay of Pigs invasion
- 1962 Lawrence of Arabia, British Beatlemania  
Ole Miss, John Glenn, Liston beats Patterson
- 1963 Pope Paul, Malcolm X, British Politician sex  
J.F.K. blown away, what else do I have to say
- 1964-89 Birth control, Ho Chi Minh, Richard Nixon back again  
Moonshot, Woodstock, Watergate, Punk Rock  
Begin, Reagan, Palestine, Terror on the airline  
Ayatollah's in Iran, Russians in Afghanistan  
Wheel of Fortune, Sally Ride, Heavy Metal, Suicide  
Foreign debts, Homeless Vets, AIDS, Crack, Bernie Goetz  
Hypodermics on the shores, China's under martial law  
Rock and Roller cola wars, I can't take it anymore
- Chorus: We didn't start the fire  
It was always burning since the world's been turning  
We didn't start the fire  
No, we didn't light it, but we tried to fight it
- We didn't start the fire  
It was always burning since the world's been turning.  
We didn't start the fire  
But when we are gone  
It will still burn on, and on, and on, and on... (Joel, 1989).

Social change (civil rights, television, birth control), political dynamics

(McCarthyism, communism), issues with medicine (a cure for polio, Thalidomide),

international relations (Russia, Korea, Vietnam), national security (Sputnik, Castro), popular culture (Marilyn, Elvis, Beatles), consumerism (Coca Cola, Hula Hoops), and our collective consciousness and loss of innocence (JFK, Malcolm X, Eichmann) – all these impacted our collective self-image and our individual self-concept. These events shook many Americans with an enhanced awareness of themselves in relation to the world, awakening a desire to know and to learn more.

Furthermore, most Americans wanted to partake of the unprecedented growth and prosperity of the US in the mid-twentieth century – they wanted a piece of the American Dream. And in the American mythology, the Dream is inextricably tied to education. So, each year, by ever-increasing numbers and as unprepared as they were, Americans headed off for college. Casazza (1999) points out that there was a “broadening of higher education, both its curriculum and student body. With this increasing breadth came diversity” (p. 4). These students, naturally, came with diverse experiences (academic and otherwise), diverse levels of preparation, diverse expectations, and diverse skills and talents. Although often faced with opposition and cloaked in controversy, responsible institutions have had little choice but to try to find ways to meet the needs of these students.

In his article, *A Memory Sometimes Ignored: The History of Developmental Education*, Arendale (2002) pays homage to those nameless educators who worked with passion and dedication to meet the needs of the underprepared students for almost 300 years. Arendale makes convincing arguments that these individuals and their work are largely forgotten and/or ignored because to acknowledge “the role and importance of



developmental education presents potentially uncomfortable statements about the historical state of higher education” (p. 8). Inclusion in the historical record, he contends, would bring further indictments of the K-12 educational system; it would show more clearly the deprived and disadvantaged conditions of those who were not white privileged males; it would show just how widespread and necessary the “developmental programs” actually were; it would reveal the scope of those who were lost because they did not have such programs; it would expose the huge cost of diverting scarce financial resources from research and effective academic preparation only to be tied up in the patchwork bindings that institutions came up with to stop the bleeding and hide the wound.

### **Developmental Education Gains Recognition**

A handful of developmental educators, however, had a vision. They believed in the legitimacy of their work; they believed a much better job could be done for those students in need; they dreamt of recognition for themselves and their colleagues as the professional educators they are; and they believed developmental education deserved a prominent place in the history of American education. So in the spring of 1976, a small group of developmental educators from the Chicago area met to discuss the establishment of a professional association (Boylan, 2005). The first president (Dr. Gary Saretsky of Chicago State University) and the first vice-president (Dr. Harold Hild of Northern Illinois University) were elected and each served in their respective capacities until 1981. It was during this five-year period from 1976 to 1981 that the constitution

and by-laws were developed for the National Association for Remedial/Developmental Education in Postsecondary Education (NAR/DSPE). This uncomfortable name was changed 1984 to the familiar, current, and imminently more pleasant title of the National Association for Developmental Education (NADE).

In 1978, Sheila Tobias released her seminal work, *Overcoming Math Anxiety*, and it seized the attention of mathematics educators, as well as mathematics students, their parents, and a host of others. Works such as that by Tobias brought the possibility of overcoming difficulties with mathematics into the mainstream consciousness. And that newfound hope most likely helped fuel the phenomenal growth of NADE. During the decade of the 1980s the association began adding state and regional chapters. A membership of 400 with only two local chapters in 1981 had grown by 1990 into a membership of 2000 with 28 chapters representing 35 states and the District of Columbia (Boylan, 2005).

The *Journal of Developmental Education*, first published in 1983, has since become the definitive research journal for developmental education and has a circulation of over 5000. Boylan (2005) has described the 1980s as a decade of *development* and the 1990s as a decade of *expansion* for NADE. Indeed, in addition to the Journal of Developmental Education, NADE also now publishes The NADE Digest, as well as monographs, newsletters, and other materials. Sister organizations, the College Reading and Learning Association (CRLA) and the National Center for Developmental Education (NCDE) publish the *Journal of College Reading and Learning* and *Research in Developmental Education*, respectively. These three groups also work cooperatively

from time to time in sponsoring conferences and workshops at both the regional and national levels. NADE has developed financial grants to support graduate education and to conduct research. An annual awards program includes recognition of an outstanding developmental educator as well as for outstanding research and outstanding publications. There are 29 local chapters now covering all 50 states and 16 Special Professional Interest Networks (SPINs) providing special professional growth opportunities. NADE has been instrumental in bringing much needed recognition of developmental education across the broader educational spectrum.

The National Center for Developmental Education (NCDE) is located at Appalachian State University in Boone, North Carolina. One very important professional development opportunity provided by NCDE is *The Kellogg Institute for the Training and Certification of Developmental Educators*. The Kellogg Institute, as it is commonly referred to, is the nation's longest running advanced training program for developmental educators and learning skills specialists (NCDE, 2008). Established in 1980, The Kellogg Institute is a nationally recognized program conducted by carefully selected practitioners and theoreticians. Certification is granted by NCDE and the Kellogg Institute, with all graduate courses offered through the Department of Leadership and Educational Studies at Appalachian State University. The institute was originally funded by the W. K. Kellogg Foundation and later by the Fund for the Improvement of Postsecondary Education (FIPSE). It is now supported through participant fees and other Appalachian State University resources.

The cooperative efforts of NADE, NCDE, and CRLA have served to enhance, enrich, and extend the impact of each organization. Research has produced results applicable across the board and enabled each to focus their efforts more productively. Researchers have defined and disseminated guidelines for best practices (Boylan, Bliss, & Bonham, 1997; Lamire, 1998). Research has shown ways to improve classroom instruction, program effectiveness, institutional policy, academic support, and learning outcomes (Maxwell, 1997; HEES, 1992; Martin & Arendale, 1994; Boylan, 2002; Roueche, 1973; Higbee, McDonald, Van Blerkom, Payne & Smilkstein, 2007).

The profession of developmental education has made great strides, especially during the past 30 years. Institutions need not be in the dark with respect to providing quality, effective programs for their underprepared students. Studies of developmental education in Texas colleges and universities have shown that institutions (and hence, students) succeed in proportion to the implementation of research-based best practices (THECB, 2005; Boylan et al., 1997). Boylan and Saxon (2008) itemize key high-level best practices while, again, emphasizing the centrality of research in their article, *What Works in Remediation: Lessons from 30 Years of Research*, when they write:

Thirty years of research has provided us with a great deal of information on how to deliver remediation effectively. There is, as a result of this research, a rather substantial body of knowledge to guide the practice of those who work with underprepared students.... We can say with some certainty that the following techniques, models, or structures contribute to successful remediation.

- The establishment of clearly specified goals and objectives for developmental programs and courses.
- The use of mastery learning techniques in remedial courses.
- The provision of a high degree of structure in remedial courses.
- The use of a variety of approaches and methods in remedial instruction.
- The application of sound cognitive theory in the design and delivery of remedial courses.
- The provision of a centralized or highly coordinated remedial program.
- The use of formative evaluation to guide program development and improvement.
- The establishment of a strong philosophy of learning to develop program goals and objectives and to deliver program services.
- The implementation of mandatory assessment and placement.
- The provision of a counseling component integrated into the structure of remedial education.
- The provision of tutoring performed by well-trained tutors.
- The integration of classroom and laboratory activities.
- The establishment of an institution-wide commitment to remediation.
- The assurance of consistency between exit standards for remedial courses and entry standards for the regular curriculum.
- The use of learning communities in remedial instruction.

- The use of Supplemental Instruction, particularly video-based Supplemental Instruction to support remedial courses.
- The provision of courses or workshops on strategic thinking.
- The provision of staff training and professional development for those who work with underprepared students.
- The provision of ongoing student orientation courses.
- The integration of critical thinking into the remedial curriculum.

It is interesting to note that although this body of knowledge has been available it has not been widely used by practitioners. The authors' observations from statewide studies of remedial education in Mississippi, South Carolina, North Carolina, and Texas suggest that fewer than half of the faculty teaching remedial courses are trained to do so or use the literature of the field to guide their practice. Providing effective remediation is not a mysterious proposition. We know how to do it. We simply do not use what we know (p. 12-13).

The authors continue by invoking Claxton (1992) who declared that, "Bad remediation costs about as much as good remediation." Those who stir controversy concerning developmental education and its costs might do well to first investigate the nature of the programs they cite with respect to the use of research-based best practices. The Texas Higher Education Coordinating Board (THECB, 2006) has pointed out that, "Once placed in developmental programs, these underprepared students seldom achieve academic success—less than 20 percent ultimately complete developmental programs

and earn baccalaureate degrees” (p. 7). This may, indeed, be the sad state of affairs that exists, but if we will do what we know to do, then it doesn’t have to stay that way.

### **A Constructivist Approach to Mathematics Education**

Contemporaneously with the emergence of developmental education as a research-based professional association were noteworthy changes in the rest of the American educational system and in its philosophical underpinnings. In particular, the most widely embraced theoretical frameworks for teaching and learning mathematics have undergone major changes over the past 30 years. Outlining the dominant theories of learning and motivation for the second half of the 20<sup>th</sup> century, Svinicki (1999) describes a transition “from a behavioral perspective on learning to a cognitive perspective ... [to] constructivist and personal responsibility models of learning” (p. 5). The behaviorist model had dominated the 1960s and 1970s, various cognitive models dominated the late 1970s and 1980s, and a constructivist model has come into prominence through the 1990s. And this constructivist model continues to the present time to be the most widely held theoretical framework for teaching and learning mathematics.

Van De Walle (2007) points to the National Council of Teachers of Mathematics (NCTM) as the predominant advocates of a constructivist approach to teaching and learning mathematics. The effort to bring about significant change in mathematics education by NCTM and others has become known as the Reform Movement and

culminated with several key publications including the *Principles and Standards for School Mathematics* (NCTM 2000).

Rooted in the cognitive theories of Piaget, the fundamental tenet of constructivism is that knowledge cannot be implanted, absorbed, or downloaded. Instead, each one of us constructs our own knowledge. Through active and reflective thinking, one constructs new knowledge in relation to and in connection with one's prior knowledge. Only in this way can the new knowledge become integrated, useful, and meaningful (Van de Walle 2007; Sousa 2006). This, of course, does not mean that the teacher is inactive. Teachers continue to bear responsibility for providing opportunities for student of develop their mathematical understanding. No longer simply "covering" the content, today mathematics teacher must find creative ways to allow students to participate in the process of learning mathematics. NCTM's (2000) five process standards are (i) problem solving, (ii) reasoning and proof, (iii) communication, (iv) connections, and (v) representation.

Van de Walle (2007) extends an invitation, and a challenge, to "do mathematics" (p. 12). He asserts that to *do* mathematics, as presented in the *Principles and Standards*, is to:

explore	represent	explain
investigate	formulate	predict
conjecture	discover	develop
solve	construct	describe
justify	verify	use (Van de Walle, p. 13)



His point, of course, is that to do mathematics is NOT simply to perform mindless calculations. When the process standards indicate students should “build new mathematical knowledge through problem solving” (NCTM, 2000, p. 52), then we educators must understand that the emphasis is on teaching *through* problem solving, not simply *about* problem solving. The learning of mathematics happens *as one is solving problems*. Van de Walle elaborates, “A [good] problem is defined here as any task or activity for which the students have no prescribed or memorized rules or methods, nor is there a perception by students that there is a specific “correct” solution method” (p. 37). The challenge for teachers, of course, is designing mathematical tasks that begin where the students are (so they can build on their prior knowledge), that engage them in *doing* (i.e., exploring, predicting, estimating, inventing) mathematics, and that require explanations and justifications – not just answers.

The teacher who provides opportunities for students to employ and engage the process standards are equipping them with the tools to acquire and to use mathematical knowledge. Furthermore, the mathematical knowledge they gain will be grounded in a *conceptual* understanding, not just a *procedural* understanding. These process standards do not represent separate components in the mathematics curriculum. Rather, according to Van de Walle, they “direct the methods or processes of doing all mathematics and, therefore, should be seen as integral components of all mathematics learning and teaching” (p. 5).

Although the *Principles and Standards for School Mathematics* (NCTM, 2000) does indeed address teaching, learning, and assessment, according to Van de Walle, the

emphasis of the material is on the curriculum. It is within the *Professional Standards for Teaching Mathematics* (NCTM, 1991) that one finds a greater focus on teaching. A constructivist philosophy would necessarily have implications for *how* we teach and *how* we conduct our classrooms. In reiterating the content of the *Professional Standards*, Van de Walle lists five major shifts in the environment of mathematics classrooms that are needed embrace a constructivist approach and, more importantly, to empower students in terms of their mathematical ability. They are:

- Toward classrooms as mathematical communities and away from classrooms as simply a collection of individuals
  - Toward logic and mathematical evidence as verification and away from the teacher as the sole authority for right answers
  - Toward mathematical reasoning and away from merely memorizing procedures
  - Toward conjecturing, inventing, and problem solving and away from an emphasis on the mechanistic finding of answers
  - Toward connecting mathematics, its ideas, and its applications and away from treating mathematics as a body of isolated concepts and procedures
- (Van de Walle, p. 6)

In the learner-centered framework of constructivism the uniqueness of each learner is of vital importance. In particular, Svinicki (1999) points out that “the level of prior knowledge that the learner brings to the situation is the biggest individual variable in determining how much is learned” (p. 9). It is essential that educators grasp this point

if we are to understand the importance of getting to know our students and if we are to help those who are disadvantaged and underprepared.

Henningsen and Stein (1997) assert that the “prior failures of poor and minority students are due to a lack of opportunities to participate in meaningful and challenging learning experiences, rather than to a lack of abilities or potential” (p. 527). Clearly, developmental mathematics teachers have little or no means of impacting the level of knowledge attained, or the quality of learning activities experienced, by their students *prior* to their arrival in the developmental mathematics classroom. We can, however, assess their mathematical proficiency and introduce them to meaningful and challenging learning experiences once they are there.

Especially with adults, improved attitudes and self-efficacy with respect to mathematics has the potential to open up additional lines of communication and, therefore, opportunities for learning. In particular, with an improved attitude and enhanced self-image an adult is much more likely to engage in informal and self-directed learning projects. Since developmental students are typically adult students, it is only natural that one of our major goals would be enabling them “to be lifelong, self-directed learners” (Merriam and Cafarella, 1999, p. 288). After all, Merriam and Cafarella assert, learning on one’s own is “the primary mode of learning in adulthood” (p. 288).

After prior knowledge, Svinicki (1999) references cognitive processing and personality variables as key components in determining the quality of the learning experience. Personality variables include the ability or facility to cultivate self-

awareness, manage one's emotions, motivate one's self, recognize emotions in others (empathy), and handle relationships.

According to Goleman (1995), an individual's temperament directly impacts the propensity for success or failure. Consider the impact of an optimistic attitude, for example, on sales success. Goleman cites a study (Seligman, 1991) wherein insurance industry giant MetLife hired a group of applicants who scored high on a test for optimism, but failed the normal screening tests. This group outsold a *qualified* group of pessimists by 21% the first year and by 57% the second year. While the mental mindset of a pessimist often leads to despair and failure, that of the optimist often leads to hope, persistence, and success. Some attitudes might very well be inborn, or natural, temperaments; they still may be tempered and cultivated by experience. "Optimism and hope—like helplessness and despair—can be learned" (p. 89). Goleman elaborates:

Underlying both is an outlook psychologists call *self-efficacy*, the belief that one has mastery over the events of one's life and can meet challenges as they come up. Developing a competency of any kind strengthens the sense of self-efficacy, making a person more willing to take risks and seek out more demanding challenges. And surmounting those challenges in turn increases the sense of self-efficacy. This attitude makes people more likely to make the best use of whatever skills they may have—or to do what it takes to develop them. (p. 89-90)

It is especially clear to those who teach mathematics that success breeds success—and hence an increase in self-efficacy—and, on the other hand, failure unfortunately has exactly the opposite effect.

Goleman's (1995) work is part of a greater body of work that is dedicated to brain-based educational research. Because of the work of individuals like Jensen (2005), Kotulak (1997), and Sousa (2006) the role of emotions and self-efficacy are beginning to attract the attention of even more researchers. There is a broader recognition that the brain is a complex adaptive system, that the brain innately searches for meaning and patterns, that emotions are a critical part of the *meaning-making* process, and that every brain is unique in operation and organization.

Students who are in developmental mathematics courses often have a history of failure in mathematics and, consequently, have a low measure of self-efficacy. It is important that developmental educators explore a variety of ways of positively impacting our students in order to improve their self-efficacy, facilitate their learning, and develop a responsive pedagogy.

### **Theoretical Framework**

The current investigation into the stories of *individual* former developmental mathematics students is consistent with the move toward "classrooms as mathematical communities and away from classrooms as simply a collection of individuals" (Van de Walle, p. 6). Although we engage individually in constructing knowledge and in meaning-making, we clearly do not exist in isolation. The value of a community of learners to each of its participants has been clearly established (Gredler & Shields, 2007; Kozulin, Gindis, Ageyev, & Miller, 2003).

Developmental mathematics students rarely tell happy stories about learning mathematics. Rather, they often reflect tales like this one:

And on the eighth day, God created mathematics. He took stainless steel, and he rolled it out thin, and he made it into a fence forty cubits high, and infinite cubits long. And on the fence, in fair capitals he did print rules, theorems, axioms and pointed reminders. 'Invert and multiply.' 'The square on the hypotenuse is three decibels louder than one hand clapping.' 'Always do what's in the parentheses first.' And when he finished, he said 'On one side of the fence will reside those who are bad at math, and woe unto them, for they shall weep and gnash their teeth.'

Math does make me think of a stainless steel wall – hard, cold, smooth, offering no handhold; all it does is glint back at me. Edge up to it, put your nose against it; it doesn't give anything back; you can't put a dent in it; it doesn't take your shape; it doesn't have any smell; all it does is make your nose cold. I like the shine of it – it does look smart, intelligent in an icy way. But I resent its cold impenetrability, its supercilious glare. (Buerk, 1982; p. 19 quoted in Brown, 1996, pp. 1291–1292)

Buerk's experiences are the norm rather than the exception. However, when circumstances allow students to tear down that icy wall, their story can be revised.

The debates and discussions between the radical constructivists and the social constructivists are themselves productive. Norton and D'Ambrosio (2008) studied the constructions that a teacher fostered in students' mathematical development as the teacher operated within each of two zones of learning – one grounded in a social constructivist perspective on learning (Vygotsky, 1978; Kozulin et al., 2003) and the other in a radical constructivist perspective (Piaget, 1950; von Glasersfeld, 1995; Steffe & Thompson, 2000). Norton and D'Ambrosio concluded that, even though the roots of the two constructs differ considerably, "radical and social constructivist implications for teaching ... are compatible." (p. 245). Furthermore, they point out that Piaget "recognized the critical importance of

language and social interaction” and that Vygotsky “recognized the importance of the internal place of development” (p. 245). Language, social interaction and internal development are all connected through discourse.

Language and social interaction, as well as individual development and meaning-making, play significant roles in informing my narrative analyses of the life stories told by the participants in this study. For this is a study concerned with reflection and story.

Mezirow (1991) once lamented that most theoretical work and research on learning had focused on problem solving, roles of perception, recognition, and recall. But, he maintains, it is reflection that is the central operator in intentional learning. And intentional learning involves “either the explication of the meaning of an experience, reinterpretation of that meaning, or application of it in thoughtful action” (p. 99). He continued his complaint by declaring that “there has been an egregious disregard for the function of reflection, which makes enlightened action and reinterpretation possible” (pp. 99-100).

For Bruner (1996) narrative is “a mode of thinking—a structure for organizing our knowledge” (p. 119). This study makes its contribution to the knowledge base through narrative analyses of the stories former developmental mathematics students tell as they reflect on their experience, explicate the meaning of their experience, reinterpret their experience, and share how they have applied what they learned to becoming mathematics teachers and educators—as they organize their knowledge about their experiences. Smith (2002, 2003, 2004) has previously documented aspects of narrative practice in the classroom, as relates to prospective teachers’ learning in her courses, yet these have focused on those individuals who were enrolled in preservice educational

programs. To date, no one has asked former developmental mathematics students, who became mathematics teachers, to reflect on their experiences. The narrative mode, as Bruner (1986) posits, “strives to put its timeless miracles into the particulars of experience, and to locate the experience in time and place” (p. 13). That time and place of miracles for the participants in this study was their developmental mathematics classrooms.

Narrative inquiry is constituted by intentional learning and reflective activity and is embedded in the “interrogating aspects of teaching and learning by storying experience” (Lyons and LaBoskey, 2002, p. 21). Narrative inquiry allows for the quality of the experience to be studied as it is contextualized and enables the researcher to bridge in some fashion the worlds of the actual experience and the meaning made of it.



### CHAPTER III

### METHODOLOGY

The purpose of this research was to understand the experiences of former developmental mathematics students as they have reflected on them and storied them so as to make meaning of those experiences. With the intention of exploring the text and the context of those experiences, I determined that a qualitative methodology was indicated; and the qualitative method that seemed best suited to such an exploration was narrative analysis. According to Rossiter and Clark (2007), narrative education embraces “the essential connection between experience and learning, and it offers a way to effect that connection by using the natural way in which all of us make sense of our experience, that is by storying it” (p.10).

#### The General Perspective

The term *qualitative inquiry* is often used in reference to a wide variety of techniques, tools, approaches, and aims of social inquiry. Among these are *phenomenology* (including inquiry rooted philosophically in existentialism, hermeneutics, and transcendentalism), *case study research*, *ethnography* (with roots in cultural anthropology), *narrative analysis*, and *life-history methodologies*—to name only a few (Schwandt, 1997; Merriam, 2001).

To a mathematician, qualitative inquiry can be quite challenging. Yet, having become convinced of the potential rewards of engaging such methods—narrative analysis, in particular—I accepted the challenge in order to explore the possibilities

offered by narrative inquiry, to broaden my own understanding of qualitative methods, and to delve into the intricacies and power of language. As one steeped in a world of numbers, symbols, theorems, proofs, logic and statistics, I was accustomed to research that “is often associated with dry, analytical processes, with data collection, number crunching, and so on” (Montuori, 2008, p. 17). But, like Montuori (2008), I sometimes felt that, “what is almost always left out of the picture is that real inquiry is *also* a process that is deeply passionate, exciting, and creative” (p. 17). Montuori is convinced that “a creative attitude [toward research] can be cultivated, developed, and encouraged” (p. 19). As a musician, I recognize my own creative impulses. As a mathematician, I see the creative beauty in mathematics. This study was both an investigation into the lives of the participants and an opportunity for me to delve into dimensions of inquiry that have expanded the scope of my own understanding.

### **The Research Participants**

This research took place during the spring and early summer of 2008 in and around colleges and schools in south Texas. Diligent care has been exercised to preserve the confidentiality of the participants. Pseudonyms have been used throughout this work for names and places that might otherwise produce a breach of their privacy. Interviews were conducted in safe, innocuous locations on state property where we could be inconspicuous and where we could have a private conversation in a public or semi-public setting. Each interview setting— typically, a classroom, a lunch area, a science

lab, a student or faculty lounge—was chosen with the convenience and the comfort of the individual participant as a primary concern.

The participants in this study comprised former developmental mathematics students who, having successfully completed their developmental mathematics coursework, were currently engaged as either full-time educators or preservice teachers. Only those *preservice teachers* who had completed their mathematics coursework requirements and who were engaged in student-teaching, or other internship activities in anticipation of graduation later this year, were accepted as participants. Only those *full-time educators* whose previous experiences as developmental mathematics students helped shape their career choice and who were presently engaged in mathematics education in some capacity (teacher, administrator, or researcher) were accepted as participants.

I posted a call for participants through various listservs and teacher-preparation programs, as well as by word-of-mouth in order to find qualified preservice teachers, active teachers, and teaching professionals with a developmental mathematics background who were interested in participating. All together 13 of the individuals who responded to the call for participants actually met the criteria and, subsequently, consented to be interviewed. The ages of the participants ranged from 22 to 55 with an average age of approximately 37. There were 7 men ranging in age from 22 to 55—with an average age of 34—and 6 women ranging in age from 29 to 48—with an average age of 40. The average duration of an interview was approximately one hour. Additional demographic information is provided in Table 1.

**Table 1**  
***Overview of Participants***

<b>Name</b>	<b>Sex</b>	<b>Age</b>	<b>Marital Status</b>	<b>No. of Children</b>	<b>Highest Degree</b>	<b>Occupation</b>
Ryan	M	22	no	0	B.S.	Student Teacher
Edward	M	27	no	0	B.S.	Community College Adjunct
Chester	M	28	yes	1	M.A.	Middle School Teacher
Steve	M	30	divorced	0	B.S.	High School Teacher
Jim	M	34	yes	2	B.S.	Student Teacher
David	M	42	yes	2	M.A.	Administrator
Tyler	M	55	yes	1	Ed.D.	University Teacher
Lori	F	29	divorced	1	B.S.	High School Teacher
Jean	F	36	yes	0	B.A.	Middle School Teacher
Linda	F	38	yes	4	B.S.	High School Teacher
Sara	F	43	yes	1	M.A.	Learning Center Director
Eileen	F	46	yes	2	Ph.D.	University Teacher
Cathi	F	48	divorced	2	M.S.	Community College Teacher

### **Data Collection**

At the convenience of the participants, interviews were scheduled—beginning with the first on April 18, 2008 and concluding with the final interview on July 22, 2008. When I met with each participant at our agreed-upon time, we carefully reviewed the research information sheet (Appendix A) and the consent form (Appendix B). After reviewing these, the consent forms were signed. Copies of both the information sheet and a signed consent form were given to each participant.

Guided by the interview questions (Appendix C), I conducted the interview which was inconspicuously recorded on audio-tape. Each tape was transcribed resulting in a total of 463 pages of transcripts, which were then analyzed for relevant data.

In all, 13 interviews were conducted, recorded, transcribed, and analyzed for data relevant to the goals of this study. The transcripts were sent to the participants to allow them to comment or correct the texts. In this way, member checks were conducted to insure accuracy of the transcriptions.

### **Data Analysis**

A narrative analysis of the stories these former developmental students had to tell presented a superb means of exploring their experience and enhancing our understanding of it (Gee, 1999; Merriam, 2001). Narrative analysis is filled with ambiguities and this reality must be accepted by researchers of the narrative form. Narrative analysis entails the exploration of human beings—individually and collectively—and there is very little that is immutable about people. Mishler points out that the purpose is to explore “issues

of personal identity and cultural values” (1986, p. 243). Mishler also asserts that stories are a form of “self-presentation, that is, a particular personal-social identity is being claimed, [and] everything said functions to express, confirm, and validate this claimed identity” (p. 243). Therefore, Mishler contends, researchers doing narrative analysis “are always making inferences on the basis of partial information. Furthermore, we do not know whether and how the missing information may be relevant to our interpretations” (p. 247). What impact might the “missing information” have on the narratives we analyze?

The importance of narrative to adult education has been described by Rossiter and Clark (2007) who pointed out that “narrative education seeks to bring content into direct relationship with the lived experience of the learner” (p. 165). There is perhaps no discipline other than mathematics where this relationship is so vital yet so often neglected. Clearly mathematics is important. Mathematics is essential to the proper functioning of an individual in a complex, technological society. It is essential to accessing a wide variety of the benefits of liberty and democracy and it is essential to the adequate engagement with the role of citizen and consumer. Without mathematics how can one participate knowledgeably and safely in the economic, cultural, medical, and educational aspects of modern life? Yet mathematics is one of the few topics about which many people almost seem proud to display their ignorance. And is there another subject where a teacher so often hears the dreaded question, “When am I ever going to use this stuff?” In the classroom, mathematics content is often woefully un-connected to the lives of those who need it so desperately. The hope and promise of using a narrative

approach to mathematics education is that the essential relationships between teacher, learner and content “are mediated by narratives in many forms” (p. 165).

Furthermore, Rossiter and Clark (2007) have emphasized that “stories are powerful as an educational method because they engage both cognitive and affective aspects of learning” (p. 165). It was my expectation that the stories told through this study would not simply illuminate how students learn mathematics, but also facilitate learning for teachers, students, administrators, their colleagues and associates about one another.

According to Rogers et al. (1999), researchers conducting narrative analysis should not stop at deconstructing what is said. They must also look at “*what is unsaid, the unsaid, and the not-said*” (p. 79, emphasis theirs). They search narratives for “*language of negation, language of revision, language of smokescreen, and language of silence*” (p. 79). It seemed that the possibilities for discerning and negotiating the smokescreens—and the silence—might best be realized with a form of narrative analysis explicated by James Paul Gee (1999) and described as “the analysis of language as it is used to enact activities, perspectives, and identities” (pp. 4-5).

Gee (1991) further asserts that narratives are “human sense making” (p. 15). This concept echoes Mikhail Bakhtin’s (1981) idea of “dialogism” to explain/expand upon his model of personal narrative. Bakhtin, a literary theorist, suggested that certain literature permits the polyphonic interplay of many different voices rather than allowing a single monologic voice to dominate. Our own psychic voices do the same thing as we grow in experience, education, and critical thinking ability. Our inner voices begin to make sense

of past experiences as we mature, but new experiences may change that “sense” as we add knowledge. Brookfield (2005) asserts that transformational learning theorists like Gould and Mezirow emphasize

the process whereby adults come to realize how childhood inhibitions serve to frustrate them from realizing their full development as persons. This realization is the first step to slaying these inhibiting demons, laying them to rest and living in a more integrated authentic manner. (p. 14)

For adults who have negotiated the minefield of developmental mathematics and come out, not only alive, but determined to help other academic refugees find safe passage, those childhood inhibitions and frustrations are often the results of negative experiences in a mathematics class. As Ochberg (1994) has recognized, “our self-idealizing identities depend on our success in meeting and overcoming the possibility of our being undone” (p. 117). The realization that they have slain the Algebraic Dragon often comes with reflecting on and telling/reinterpreting life experiences. But that polyphonic interplay of experiences still holds the promise of a mountain of dragon’s gold in a narrative researcher’s interpretation. Draw swords; it is time to hunt treasure!

### **Procedures**

The interviews were transcribed, coded, and interpreted primarily through processes developed by Gee (1985, 1991, 1999)—herein referred to as Gee’s method. Several years ago Gee (1985) published an article entitled “The Narrativization of Experience in the Oral Style.” In this article Gee outlined and applied many of the



components of his method of narrative analysis which were later more thoroughly set forth in his book, *An Introduction to Discourse Analysis: Theory and Method* (1999). A linguist by discipline who moved into the field of education, Gee has been making inroads for many years now into the knowledge and application of linguistics and narrative analysis to educational inquiry. As Riessman (1993) has pointed out, Gee relies heavily on “the poetic features of language” (p. 44). His investigative approach involves a structural analysis of the stories that individuals tell in order to understand the meaning they have assigned to their experience. Even the skeptical Riessman (p. 50) found that application of Gee’s method yielded a wealth of information about the storyteller from *both* the affective and the objective. Using Gee’s theory Riessman generated discourse units which were represented as poetic structures. Then, with the coded transcripts, Riessman explains that “repeated listening to the tapes, sensitized me to subtleties of language that I never was aware of before, and certainly never attended to in previous transcripts—intonation contours, rising and falling pitch, pauses” (p. 50) and other discourse markers. Riessman points out that, in this particular case study, the story was “as much about affective ‘actions’...as it was about ‘what happened’ in a more objective sense” (p. 52). This type of analysis fits perfectly with the goals of this research including: to understand the experience of adult developmental mathematics students and how their interpretation of that experience has influenced their self-efficacy.

This method of *narrative analysis* is the unique and particularly fascinating component of the work Gee has done. It is an analysis of the spoken and written language that one uses to communicate one’s personal, social, and cultural perspectives

and to construct and enact one's identity—how one chooses to define one's self.

Drawing on perspectives from linguistics, psychology, education, anthropology, and critical theory, language in action and in use is examined by looking at the patterns of chosen speech. Gee (1999) notes that when individuals speak they actually speak in *spurts* or bursts of words that carry meaning. The mind, he maintains, focuses “on one fairly small piece of information at a time, encodes it into language, and puts it out of the mouth as a small spurt of speech” (p. 106). Transcribed these spurts may be written as separate lines – almost as one would write a poem – or in other poetic structures that give visual representation to the features of the narrative like tone, pitch glide, stress, and so on. As one speaks in these *spurts*, the words are chosen to communicate particular ideas—but our *choice* of spurts often communicates additional information. Simply put, this poetic structure may be analyzed for additional insights into the messages being communicated and the relationships being described. The value, of course, of having the benefit of the recorded stories is that stress, tone, inflection, and other characteristics of speech may also be included in the interpretation of the data.

Using this method of narrative analysis, the researcher “looks for patterns and links within and across utterances in order to form hypotheses about how meaning is being constructed and organized” (Gee, 1999, p. 99). According to Gee (1999), an inquiry using such analysis is “based on the details of speech (and gaze and gesture and action) . . . that are arguably deemed relevant in the situation and that are relevant to the arguments the analyst is attempting to make” (p. 88). Those details offer the “cues and clues” needed for revelatory analysis (Gee, 1999, p. 85).

Gee identifies five levels of structure and meaning together with their corresponding “roles in interpretation” (p. 27). The five levels are:

- (i) Line and stanza structure
- (ii) Syntax and cohesion
- (iii) Main-line / non-main-line
- (iv) Psychological subjects
- (v) Focusing system

Examining a transcribed narrative is especially revealing once the line and stanza breaks have been made (i.e., once it has been poeticized). These breaks are based on the speech stream and are accentuated by the narrator’s own pauses, hesitations, inflections, and other speech patterns. Within each story the levels of structure guide the hearer/researcher into the corresponding roles in interpretation. From this vantage point one sees more clearly the attitudes, perspectives, concepts and the logical connections being made, and one can often obtain a much clearer depiction of the true plot—the context, the (rising) conflict, and the resolution—of the story. A careful reading of a poeticized transcript, with guidance from Gee’s methodology, holds the promise of revealing a number of narrative components that otherwise would have been overlooked. Because they are particularly illustrative narratives, stories pulled from four representative transcripts are presented and analyzed in the next chapter. All the interviews are utilized in the determination of the overall findings. In looking for data within and across participants, constant-comparison, categorization, and contextualization were all used in some measure (Glaser & Strauss, 1967; Lincoln &

Guba, 1985; Riessman, 1993). However, as Lieblich, Tuval-Mashiach, and Zilber (1998) have stressed “many possibilities for reading a text represent middle points along these dimensions” (p. 12) in reference to apparent extremes of “(a) holistic versus categorical approaches and (b) content versus form” (p. 12). Gee has suggested that some conventions “will take a back seat” (p. 99) as the analyst shuttles back and forth between form and content, categories and context, in order to understand the meaning that the narrator is conveying about “the world, identities, and relationships” (p. 99). Throughout the study attempts have been made to adhere to Gee’s suggestion that we allow the emerging data to guide the inquiry going forward and, thereby, draw upon the principles from a variety of qualitative research conventions.

### **Summary of the Methodology**

This purpose of this qualitative study is to understand the experiences of former developmental mathematics students as they have reflected on them and storied them so as to make meaning of those experiences. The qualitative method that seemed best suited to enhancing my understanding of their experiences was narrative analysis. I recruited participants to tell the stories of their experiences before, during, and after enrollment in a developmental mathematics course or program. For this study I utilized audio-taped interviews and coded (poeticized) transcripts as data sources. After participants meeting the criteria were identified the nature of the research was explained to them and consent forms were signed. The semi-structured and informal interviews were recorded and transcribed. The transcribed manuscripts were submitted to respective participants for

member-checks in order to eliminate possible errors and to verify the accuracy of the data. The transcripts were then analyzed using Gee's method of narrative analysis, together with other accepted principles of narrative research and interpretation, in order to gain a better understanding of their experiences.

## CHAPTER IV

### RESULTS

This study was conducted in order to explore the experiences of former developmental mathematics students who have already begun, or are now beginning careers, as professional mathematics educators—teachers, researchers, or administrators—with respect to the general institutional climates, the culture of higher education, society in general, but especially issues related to self-efficacy and success with mathematics. The research questions that defined and guided the study were:

1. What do former developmental mathematics students, who ultimately chose careers in mathematics education, identify as primary contributors to their success in mathematics and how has their experience in developmental mathematics shaped their career?
2. What impact did faculty/institutional behaviors and attitudes have on these adult developmental mathematics students?
3. What more can be learned about the educational experiences of the participants that can inform future research and practice?

The primary instrument chosen to facilitate exploration of the answers to these questions was the story. Each participant was invited to share his/her experience which was recorded and transcribed. After transcription the text was poeticized using Gee's (1999) method of narrative analysis and linguistic techniques described by Tannen (1990) as well as constant-comparison, categorization, and contextualization in order to enhance my understanding of the stories (Glaser & Strauss, 1967; Lincoln & Guba, 1985;

Riessman, 1993). By contextualization I mean what Lieblich et al. (1998) call a holistic approach. They emphasize that blending approaches to narrative text is not uncommon as “fine distinctions are not always clear-cut in the reality of conducting narrative research and interpretation. Form is not always easily separated from the content of the story” (p. 14). It is noteworthy that the word *idea* derives from the Greek and refers to both content and form. Tannen (1990) insists that “form and meaning are inseparable; understanding grows out of form as much as – or more than – it grows out of proportional or referential meaning” (p. 16). It is with just such an approach to the stories told by the participants that I was able to participate in their sense-making and to more fully understand their experiences. The main findings, then, of the study are:

- Some developmental mathematics students have the capacity to become not only competent students but to become outstanding educators and scholars as well.
- Affective components are relevant not only to the developmental mathematics student’s role as a learner but in his/her choice of career as an educator.
- For some developmental mathematics students, a sense of self efficacy stems from a relationship and connection with the developmental mathematics teacher more so, even, than with the material being learned. There is a desire to be like the teacher who helped them and to have that kind of impact themselves.
- The narratives revealed that the women overcame especially difficult obstacles, often while carrying heavy responsibilities for children and finances, yet they not only overcame those obstacles, they integrated their triumph into their overall educational experience and into the fabric of their life story.

The importance of stories told of lived experience must be highlighted and appreciated. Kenyon and Randall (1997) argue that life is text, that “it is not a given entity but something we compose, as we might a novel or poem” (p. 62). They invoke the Greek term, *poeisis*, the root word for poetry, as has been used to express the “language nature” (p. 62) of human beings with implications as a creative life-force to maintain that we *are* the stories we tell. The stories reflect the meaning we have made of the experiences we have lived. According to Kenyon and Randall (1997), “With language as our loom ... every one of us is a weaver, continually fashioning and refashioning the fabric of our being from the countless events and influences, circumstances and relationships, that are its content.” (p. 63).

Linde (1993) concurs by asserting that our stories “express our sense of self; who we are and how we got that way” (p. 3). She emphasizes that we are creating our selves by means of stories by pointing out that our narration “necessarily creates a distinction between the narrator and the protagonist of the narrative, and interposes a distance between them” (p. 105). Thus the narrator “can observe, reflect, adjust the amount of distance, and correct the self that is being created” (p. 105). Our stories are how we position ourselves in the world and how we make sense of that world we inhabit.

Interestingly, the *poeisis* is reminiscent of Kristeva’s (1986) *Revolution in Poetic Language* wherein she explores the formation of our psyche in relation to our development of language. Tannen (1990) also speaks of the “poetics of conversation” (p. 15) in relation to our use of language or conversation in achieving coherence and meaning-making. Such views lend support to Gee’s (1999) assertion that “speech is



produced in small spurts” (p. 99) of poetry-like phrases with which we convey our intended, or sometimes unintended, meaning. The analyst, according to Gee, “looks for patterns and links with and across utterances in order to form hypotheses about how meaning is being constructed and organized” (p. 99).

Transcribed narratives reflecting these spurts in the speech stream allow for a better understanding of what the narrator is communicating. This is effective since, as Gee explains, “the ear puts them together and gives us the illusion of speech being an unbroken and continuous stream” (p. 99). But by identifying lines, stanzas, intonations, and repetitions we can often obtain a deeper understanding of the speaker’s message, especially when the psyche is experiencing stress or pain. After all our narrative, our story, is “the way we make deep sense of problems that bother us” (p. 113).

There should be little doubt that, even under the best of circumstances, learning that one’s academic skills and preparation for higher education are sub-par would be stressful. Whether due to the stigma of being academically deficient, the additional costs of paying for the unanticipated courses, or the delay in being able to get on with “real” credit-earning courses, the developmental student is certainly subject to possibility of stress. Yet the participants in this study overcame stress, and other obstacles, to successfully complete their developmental mathematics program. How did they do it?

### **Student-Identified Contributors to Success**

The first part of the first research question was concerned with discovering what the participants themselves identify as primary contributors to their success in

mathematics. To answer this, as well as the other research questions, we will examine stories shared by four of the participants: Jim, Cathi, Eileen, and Chester. These were chosen because they are particularly illustrative narratives and are highly representative of the kind of stories that informed this study.

### *Meet Jim*

Jim is a 34 year old Hispanic male who was born in the US. He is bilingual with English as his first language. He married at age 18 while still in secondary school. Soon thereafter he completed secondary school and took a job in order to support his wife and two children who quickly arrived. He worked as a truck driver, making a decent living wage, for 11 years, and then an accident permanently damaged Jim's knees. Jim was no longer able to drive a truck since the job involved loading and unloading heavy cargo. He would have to get a new job – one that paid enough to support his family – and that would require training/education and, of course, acquiring a formal education beyond secondary school requires money.

In the narrative that follows, Jim recounts the events leading up to his enrollment in developmental mathematics and some of how his affinity for mathematics originated and was cultivated. Due to his injury, Jim was able to find financial assistance through the Texas Department of Assistive and Rehabilitative Services (DARS) which was formerly known as Texas Rehabilitative Services (TRS). Today, Jim is completing his student teaching (during the Fall 2008 semester) and will be accepting a position as a secondary mathematics teacher shortly after that, most likely in spring because of the demand for mathematics teachers in his area.

1       *Jim and DARS*

2

3       I've always loved math, you know—

4       Math was my thing, you know.

5               I could

6                       —that I can recall—

7                                       I've been able—

8       My dad's good at math

9               and I've been good at math

10              since, you know,

11                       a young age, but I really—

12                      I really didn't see myself

13                      doing anything with math education.

14

15       I, uh, I wanted to see myself as—

16       I pictured myself as

17                      a business person.

18       You know, you saw that on TV all the time.

19       You wanted to grow up to be a businessman—

20               • work in an office

21               • nine to five,

22               • have a nice car

23               • doing your job,

24               • going home,

25               • nice house.

26       I saw myself as that.

27

28       But as I got older, I—

29       I started to slack.

30 I slacked in every single thing—  
31 especially in math,  
32 and math was my—  
33 like I said—  
34 my favorite.  
35  
36 In high school the only problem—  
37 the only thing I had trouble with was my—  
38 in my math classes—  
39 was Geometry.  
40 Same thing—I hated Geometry...  
41 I didn't hate it—  
42 I just—I guess I just  
43 can't grasp the concept of—a lot of the concepts in it.  
44  
45 And I started working—  
46 got hurt at work, uh,  
47 went through the Texas Rehab Commission  
48 --which is now DARS  
49  
50 I was a truck driver, uh,  
51 flatbed truck driver—  
52 back in '03  
53 I dislocated my kneecap—  
54 Permanently.  
55 Destroyed the cartilage in my knee.  
56  
57 So, my doctor recommended me—  
58 Said, "You know what? You're not gonna go back to truck driving."

59                   He goes, “You can, but you’re not gonna last.”  
60                   And he goes, “Go to the Texas Rehab Commission. Go.”  
61                   And I’m like, “Okay.”  
62  
63           But I never went.  
64                   I never went.  
65           I put it off and  
66                   I put it off.  
67  
68           And, I think after my second surgery  
69           he told me straight out,  
70                   “You’re not gonna be able to go back to truck driving.  
71                   I’m sorry, you know, you can,  
72                   but you’re going to do more damage—  
73                   and you’ll be back in here within the next year or two—  
74                   with worse than what you are now.”  
75           And I’m like, “Okay.”  
76  
77           So he kept telling me,  
78                   and every time I went  
79                   he would tell me,  
80           “Go to talk to the Texas Rehab—  
81                   they have counselors.”  
82  
83           And, when I was going through that,  
84                   and when I was with my doctor,  
85                   after my second surgery, they sent me to a—  
86                   a work coordinator, and there I met a counselor.  
87

88       He would go in there  
89                               and talk to us  
90   and give advice,  
91               and he used to WORK with the Texas Rehab, he said.  
92  
93       And he was like, “You know what?  
94                               Go to school.  
95                               You know, they pay for a lot of it.”  
96       He goes, “Sometimes these people act like it’s their money.”  
97       And he goes, “It’s not—  
98                               it’s government money.”  
99       He goes, “Yeah, we don’t give it away easily, either.  
100       But, you know—GO  
101               you have a good strong case,  
102                               and you know,  
103                               a lot of you all have, full-time disability.  
104               They’ll pay for your school.  
105               They’ll pay for anything.  
106               They’ll help you.  
107               They’ll do the best they can.  
108       You know, you might have to put money out of your own pocket, but—  
109                               think about it.  
110       You know, tuition for a year is anywhere between,  
111                               depending on what you want to do,  
112                               four to six thousand a year—uh, a semester.  
113       If you’ve only gotta pay—  
114                               figure a hundred dollars a thousand—  
115                               you’re still paying a lot less  
116                               than what you would.”

117  
118       And I talked to my wife, and  
119       then I talked to my doctor again,  
120               and I just—out of the blue,  
121               I just got the number that he had given me  
122                       and I called them,  
123               and I uh, asked for the COUNSELOR OF THE DAY.  
124  
125       And she set up a meeting with me,  
126               called me in,  
127               asked me,  
128               “Well, what do I wanna do?”  
129       I’m like, “Well, I don’t know.”  
130       And she, “Well, what have you done?”  
131       I’m like, “Well, everything—I’ve done is warehouse.  
132               • I’ve done warehouse  
133               • and I’ve done driving.  
134               • and I’ve done construction,  
135               • I’ve done carpentry.”  
136  
137       She says, like,  
138               “Well, you can’t do that anymore. You have a bad knee.  
139               I’m sorry, but you have to change.”  
140       And she’s like—  
141       “Well, what would you like to do?”  
142  
143       And I’m like, “You know that my doctor’s—”  
144               um, not receptionist,  
145               she’s like a receptionist—

146                               for him that helps him—  
147                               do all the paperwork.  
148       And...I'm like,  
149                               "—she's been real good to me  
150                               and I would like to help other people that—  
151                               that are in my situation."  
152       'Cause she fought for me,  
153                               for my second surgery;  
154       she helped me fight  
155                               for my third surgery—  
156       She helped me do  
157                               a lot of the paperwork  
158                               and a lot of the fighting that I did.  
159  
160       And, I told her, I said,  
161                               "I would like to do something like that,  
162                               you know, to help other people."  
163       And she was like,  
164                               "Well okay, you know what?  
165                               I'm gonna send you for a—it's like an IQ test.  
166                               You're gonna do it about so long,  
167                               depending on what it is,  
168                               and they'll give us the results and we'll let you know,  
169                               you know,  
170                               what careers are good for you."  
171       So I was, "Okay."  
172  
173       I went in.  
174                               I did the test.



175 I did the test.  
176  
177 She called me back in, I think, a week later,  
178 and said,  
179 “Okay, you can come into my office after lunch today,  
180 we’re going to talk about your results.”  
181 I went in and she said,  
182 “Okay, you know what?  
183 You talked about the clerical work for the doctors?”  
184 And she was like,  
185 “I’m sorry but it says right here you wouldn’t be good at it.  
186 You don’t have the patience.”  
187 She wrote in,  
188 “What else did you think about?”  
189  
190 I’m like, “I don’t know, really.  
191 I hadn’t really thought about anything else  
192 —pretty much been—”  
193 I was in depression at the time.  
194 I said—so I pretty much didn’t know what I wanted to do anymore  
195 with my life.  
196 I said, “I see my kids running around  
197 and I see my kids doing things and—”  
198 I said, “I’m not there.”  
199 I said, “Honestly and seriously right now—  
200 I’m lost.  
201 I’m at a lost point where I don’t know what to do.”  
202  
203 And, she gave me my results,

204                   she goes, "Look at your results."  
205       And I'm like, "Well what does this mean?  
206                   Can you explain this to me?"  
207       And she's like, "Yes."  
208                   She said, "You scored high on this, and you scored good on this,"  
209  
210       She looked at me and says,  
211                   "But you scored very high on math."  
212       And I was like,  
213                   "Oh, oh yeah, I've always been good at math."  
214  
215       She said, "Did you ever think about teaching?"  
216       And I was like, "Yeah, when I was younger."  
217       I said, "About teaching,  
218                   and about being a businessman."  
219       I said, "But the businessman,  
220                   I ain't gonna do,  
221                   because I can't do that."  
222       I said, "I'm not the one to sit in an office all day long."  
223       I said, "I have to be moving."  
224  
225       She was like,  
226                   "Okay, lets go back to this teaching right here.  
227                   Have you ever thought about teaching?"  
228       And I said,  
229                   "Not really, not in a long time."  
230       I said, "I help my kids.  
231                   I help other people where I can, when I can."  
232

233 And, uh, she said, “Well, I’ll make you a deal.”  
234 And I said, “Okay.”  
235 And I said, “Well, let’s talk then.”  
236 And she said, “Okay. I’ll pay for you to go back to school.”  
237 She goes, “I’ll help you pay for everything.  
238 You go through the Pell Grant,  
239 whatever they don’t cover, I’ll cover.  
240 I’ll pay the difference for everything—  
241 and you go back to school.  
242 The only thing I’m gonna ask  
243 is for you not to change, you know,  
244 once you’re gonna go in for something,  
245 don’t change your major,  
246 because we can only support you for so long.  
247 And, if you go in school,  
248 and you try to stay in school  
249 for six years, seven years,  
250 we’re gonna cut you off after four or five.”  
251 She goes, “So, it’ll only take four or five years  
252 for you to get your degree  
253 if you don’t change your major.”  
254 And I’m like, “Okay.”  
255  
256 She’s like, “Well okay, let’s do paperwork;  
257 let’s see what you need  
258 to come out of your own pocket.”  
259 I said, “Okay.”  
260  
261 And at that time I’d already—I was already on disability—

262                   from Social Security.  
263       So, she starts putting—  
264                   she goes, “Oh, you know what? —Good luck.”  
265                   And she goes, “You have good luck!”  
266       She goes, “All you’ve gotta pay  
267                   is fifty dollars out of your own pocket;  
268                   for anything, whether it be for books,  
269                   for the material, and I’ll cover the rest of it.”  
270  
271       I was like, “Well, you know what?  
272                   I can do that.”  
273       I said, “That sounds good, then—  
274                   fifty bucks.”  
275  
276       I said, “I’m on a set budget.”  
277       I said, “That’s the thing, I can’t afford  
278                   to come up with money to pay—for school.  
279                   Any type of schooling, whether, you know,  
280                   for a semester—I don’t know how it goes,”  
281  
282       I said, “but I can’t, I’m on a very tight budget.”  
283                   “Whatever money I have,” I said,  
284                   “I just have for me and my kids,  
285                   and for the bills and maybe—every now and then  
286                   —take them to do something.”  
287  
288       And she was like, “Oh wait a minute—wait a minute.  
289                   You’re on a budget, right?”  
290                   And I was like, “Yeah.”

291 And she was like, “You’re on disability?”  
292 And I was like, “Yes.”  
293 She went back and put me on disability on the computer and said,  
294 “Okay, you don’t pay nothing.  
295 We pay all of it.  
296 We pay everything.  
297 We pay your books.  
298 We pay your tuition.  
299 And, as soon as you start school,  
300 I’m gonna see about getting you money for gas.”  
301  
302 So, that’s where it went from.  
303 I started—that’s where I started that,  
304 I—when I—she sent me—  
305 She’s been my,  
306 I guess you could say—my LIFESAVER.  
307 She’s done a lot for me.  
308 She’s helped me out and she—  
309 She keeps me focused.  
310  
311 Her and my wife,  
312 they’re the two ladies in my life, ‘cause—  
313 and my wife knows it.  
314  
315 I’ve told my wife before—  
316 ‘Cause they give you so many tickets for graduation, right?  
317 And I talked to my wife—  
318 She was like,  
319 “Okay, you know what?

320                   Your mom gets one.  
 321                   Your dad gets one, you know.  
 322                   Uh—I'm gonna get one,  
 323                   my kids are gonna get one,  
 324                   for sure."  
 325       She's like, and I'm like,  
 326                   "Okay, your mom, for sure,  
 327                   I don't think, you know,  
 328                   my father-in-law—  
 329                   I don't think he'll go.  
 330                   I don't think he'll go—  
 331                   he'll probably rather stay home."  
 332       I said, "The one person, for sure,  
 333                   that I want to invite  
 334                   is the lady from DARS,"  
 335                   I said—  
 336                   "Gina."  
 337       And she's like, "We can't forget her, honey."  
 338  
 339       But, she's done a lot for me—she's  
 340                   —I tell my wife,  
 341                   my wife knows her a bit—  
 342                   she's helped me—  
 343                   get everything I need—  
 344       I had the classes where—  
 345                   I needed a calculator.  
 346                   the calculator's a hundred-and-fifty dollars,  
 347                   and she's like, "No—  
 348                   as long as it's part of your degree plan—

349                   go to Wal-Mart—  
 350                   let me know how much it is.  
 351                   Call me when you're there—  
 352                   we'll take care of it."  
 353       Sure enough, I walk away with a calculator.  
 354  
 355       She bought me two calculators,  
 356                               a total of three hundred dollars then.  
 357                   And, she's like, "You need 'em,  
 358                               you're getting 'em.  
 359                   You know, we can help you so much,  
 360                               but these are part of your degree.  
 361                   You have to know how to use certain things  
 362                               when you go into your teaching,  
 363                               and we're gonna do the best we can  
 364                               to help you get them."  
 365       I said, "Okay, I've done everything—I've fulfilled my part, because—"  
 366  
 367       The Texas Rehab Commission  
 368                   is a government-funded agency, so anybody—  
 369                               anybody off the street,  
 370                               as long as you have paperwork  
 371                               from your doctor stating  
 372                               you are fully disabled,  
 373                               or—(I don't know about partially disabled)  
 374                               but I know that if you're fully disabled,  
 375                                       on any type of disability,  
 376                                       they will help you.  
 377       They will help you get a trade.

378                               They will help you.  
379       You know, whether it's going back to school,  
380                               or going to a trade center,  
381                               or going to a trade school,  
382                               they—they work with you as best they can  
383                               to get you on your feet as quickly as possible.  
384  
385       [But...] if you start dropping classes, like, like they told me,  
386                               but every time I, you know,  
387                               I've only dropped three classes  
388                               and, when I had to drop,  
389                               I talked to the person.  
390       I explained to her and I let her know  
391                               what the situations are,  
392                               what the issues are.  
393       I...she...my counselor is someone I'd go  
394                               and I'd get counseled from her,  
395                               and she tells me, you know,  
396                               what'd probably be the best thing  
397                               and how to work it,  
398                               and how to do it,  
399                               and gives me my advice.  
400  
401       So, it, it's good, I, I like her, you know.  
402       You—sometimes you're not that lucky,  
403                               because I've talked to other people  
404                               that are going through the DARS,  
405                               but their counselors are very,  
406                               very tight with the money.



407                   We can only do this.  
408                   We can only do that.  
409                   We can only do this.  
410                   We can't do that.  
411  
412           When, when they ask me about my counselor  
413                   and I tell them that my counselor  
414                           gives me money for gas,  
415                   and that my counselor  
416                           gives me this—  
417           They're like, "How the hell'd you get lucky with that counselor?"  
418                   And I'm like, "It was just luck."  
419           I said, "When I called in one day it was  
420                   Counselor of the Day."  
421           I said, "That's who they told me to call,  
422                   and it was her,  
423                           and ever since then, you know,  
424                                   IT'S BEEN HER."  
425  
426           And she's been like a godsend to me because—  
427                   like I said—  
428                   she helps me.  
429           She's...she's great, you know.  
430           Anybody that can get her as a counselor—  
431                   or anybody like her—  
432                   is privileged.  
433           And for me,  
434                   for me to have her and—  
435                   she pushes me

436 and if ever I have any trouble—  
437 like if I need a tutor on the side,  
438 like if I need to have anybody tutor me—  
439 on the side,  
440 She'll tell me straight out—  
441 "We'll pay half of a tutor for you.  
442 You know, instead of you paying the whole thing.  
443 We'll pay half for a tutor for you.  
444 So, we'll help you in whatever way we can  
445 —to get you tutored."  
446  
447 But, there's a lot of free tutoring centers  
448 that are offered at the school,  
449 so instead of abusing—  
450 I'm not a person that likes to abuse other people,  
451 because I know that there are  
452 some people out there,  
453 —and maybe, everywhere they,  
454 —anywhere you go, that  
455 abuse a privilege.  
456 I'm not, I wasn't raised that way.  
457 It's like, you know what?  
458 I'm gonna work for mine—  
459 I'm gonna do what I can.  
460  
461 And that, that's the mentality  
462 That I've always had, so to—  
463 TO PAY HER BACK—in a sense—  
464 THAT'S WHY I WORK HARD AT MY GRADES.

465  
466 I felt good, you know,  
467 when she told me about education  
468 I jumped at it.  
469 You know, because, like I said,  
470 I'd thought about it—when I was—  
471 Everybody thinks about,  
472 “Oh, I wanna be a teacher  
473 when I get older  
474 because this, this, this and this.”  
475 But then, as you get older you realize—  
476 “Oh, I don't want to be no teacher.  
477 They don't get paid enough.  
478 They don't get— ”  
479 And, and teaching, in my opinion—  
480 and from the mentors that I've had  
481 and the professors that I've had,  
482 everybody says it's not a paying job.  
483 It's not a well-paying job.  
484 You can do other things with your math degree  
485 that pay a lot better.  
486 But, for me, seeing—  
487 for my own personal kids  
488 and other families that I've helped—  
489 seeing them advance and achieve more  
490 because they get the knowledge  
491 of whatever it is that I can give them.  
492 That's more compensation than I would ever receive pay-wise.

---

***Jim and DARS***

**OUTLINE**

<u>Events</u>	<u>Lines</u>
<b>I. The Problem</b>	<b>1-115</b>
a. Early self image	1-26
b. What went wrong	28-43
c. Work and injury	45-55
d. The good doctor – treatment and advice	57-86
d. Gathering information about TRC/DARS	88-116
<b>II. Looking for Answers</b>	<b>118-176</b>
a. Making the phone call	118-123
b. Meeting Gina	125-136
c. Gina counsels	137-171
d. Taking the test	173-176
<b>III. Finding a Solution</b>	<b>177-286</b>
a. Follow-up consultation with Gina	177-213
b. What about teaching math	215-231
c. Let's make a deal	233-254
d. Financial stress	256-286
<b>IV. Working it Out</b>	<b>288-392</b>
a. Gina finds a way	288-309
b. The other woman	311-337
c. Gina keeps on giving	339-365
d. DARS/TRC is great	367-392
<b>V. Life is Good</b>	<b>393-494</b>
a. Telling friends about DARS and Gina	393-424
b. Gina gives again	425-455
c. Payback	462-465
d. The Reward	467-494

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***Figure 1. Outline for Jim and DARS***

### **Brief Discussion of *Jim and DARS***

Jim needed help (see Figure 1 for outline). He seemed reluctant to pursue the doctor's suggestions. It is unclear why, except that he seemed to harbor a hope of being able to go back to trucking. As for his success in developmental mathematics, and in college in general, it is clear that Jim credits the support he received from DARS and, especially, from Gina—his DARS counselor. In doing this analysis, I was struck by the fact that I had sat listening to Jim tell this story yet, incredulously, I did not truly register the extent of his appreciation for Gina until I examined the coded transcript.

Leaving that aside for now and focusing on DARS. Jim was incredibly fortunate to receive such support from this organization—aptitude tests, dedicated and competent counseling, supplies, materials, and tutoring services. Most developmental students do not have such support systems in place. Furthermore, Jim has apparently had the blessing of and encouragement from his family. So even though money was tight and Jim had to be frugal, he received enough financial support from the various sources so that his wife was able to stay home with their children. Moreover, in the event of illness, car trouble, or emergencies Jim was able to count on the support of extended family members. All-in-all his economic and materials needs were adequately met and, therefore, not issues of concern creating undue stress and difficulty as is the case for many developmental students.

Jim, like the rest of the participants, identified mathematics as something that he liked prior to his enrollment in developmental mathematics, college-level mathematics, or even in college. It is interesting that these individuals have had an affinity for

mathematics that simply had not previously been explored in terms of its applicability to their lives and careers. The aptitude test that Jim took was instrumental in bringing this facility with mathematics to the attention of Jim and his counselor. Once enrolled in his developmental mathematics course, Jim was able to utilize the in-class cooperative learning groups as well as an abundance of free tutoring provided both by DARS and the college in which Jim enrolled. Jim's maturity level, the responsibility of a family, and other such factors clearly served to keep Jim from lapsing back into "slacking." With a job as a high school mathematics teacher next on the horizon, Jim's appears to be an all around success story.

As mentioned, all of the participants identified mathematics as something that they either liked or were good at prior to their enrollment in developmental mathematics or in college. However, unlike Jim, whose latent ability with mathematics was simply neglected, there were some participants whose affinity for—or facility with—mathematics was suppressed. Cathi was one such individual.

### *Meet Cathi*

Cathi is a 48 year old White female, born in the US, of eastern European descent. She left a tense home when she was 17. She worked as a nurse for 10 years before marrying a soldier and moving overseas for 4 years. Shortly after returning to the states, she was divorced and in 1998, with two children in tow, found herself trying to provide for her family as a single mom. After trying her hand as a geriatric care nurse, Cathi began looking for other means of making a living. Because she enjoyed children she

thought a career as an elementary school teacher might be a possibility but, of course, that would mean college. And college meant that she would need money.

In the story that follows, Cathi tells of her early fondness for mathematics and how that was discouraged. She was discouraged, in particular, by an abusive father who “was adamant that girls are not good at math.” Mathematics, he contended, is something that women simply can’t do. He insisted that mathematics is for men only.

Cathi also shares detailed descriptions of events and struggles she endured as a single mother leading up to a moment of shocking self-discovery perpetrated by a teacher’s question. She also recounts a story of discovery about a fellow developmental mathematics student – a young girl whose half-shaved head sported a complementary half coif of hot pink – proving, once again, the old adage that “you cannot judge a book by its cover.” Today, Cathi holds a M.S. degree in mathematical statistics and teaches, among other things, developmental mathematics at a large and growing community college.

1        *Cathi Tackles Developmental Mathematics*

2

3        I was having a tough time—

4        My personal life was a big struggle at times—

5                trying to support the children and—

6                you know, finding childcare and—

7        It was a very difficult time in my life.

8

9        In developmental math, I—I had no confidence.

10                None.

11        And if you had told me then that I would—

12                end up with a degree in math and

13                end up—especially, in a college—teaching math

14        I would have fell on the floor laughing.        (laughter)

15

16        I mean there's just no way—

17                no way would I have ever, ever believed it.

18        My whole belief system was against that.

19        My father tells me—I think I did have—

20        I must have had an interest all my life

21                in math, because

22                I can remember many, many times

23                talking to my father about, you know,

24                possible career choices.

25

26        You know, when I was a child

27        I would talk to him and, uh—

28                he always was adamant

29                that girls



30 are not  
31 good  
32 at math!  
33 Girls can't do math.  
34 Uh, that's for men.  
35  
36 I very, very much believed that and  
37 I guess he pretty much convinced me that that was so.  
38 I believed him  
39 and he was very near a chemical engineer—  
40 I think I told you.  
41  
42 He did most of his college work for a chemical engineer  
43 and then had to switch for business.  
44 But he worked in an oil refinery  
45 and for many, many years he worked in  
46 the engineering department of that oil refinery.  
47  
48 So he was very—mathematically,  
49 you know, inclined.  
50 He did math everyday and  
51 I have an uncle who was—well,  
52 I guess both my uncles were engineers—  
53 They did math—  
54 but he just didn't—  
55 It wasn't for girls.  
56 I believed it.  
57  
58

59       Anyway, so I started to be in my developmental classes  
60               I didn't do real well.  
61               I had to have a lot of help.  
62       I think in my second one I met a girl—wild woman.  
63       She was very, very, very, very young—you know  
64               and she had half her head shaved  
65               and the other half was half hot pink  
66               and piercings and tattoos  
67               and I was scared to death of her for quite some time.  
68  
69       And somehow we got to talking and, bless her—  
70               she helped me a lot  
71               outside of class  
72               just showing me how to do this and that.  
73  
74       I remember in 0303  
75               having an epiphany because the instructor—  
76       I asked her a question—  
77               (I'm pretty sure it was something about fractions)—  
78       and instead of giving a specific example on the board  
79               she gave a general form, you know,  
80               using  
81                $a$ ,  $b$ ,  $c$ , and  $d$ ,  
82               and this  
83               and that  
84               and whatever  
85               and it was just—  
86  
87       I clearly remember that moment—

88                   because that's the moment—  
89           that I really connected the—  
90           you know, the general form of things  
91                   you see in the math book with specific examples.  
92           It just clicked.  
93  
94           And from there—  
95                   it started helping because  
96           I could look at the book  
97                   and understand what I was looking at.  
98  
99           And so when I teach I try very hard to—you know—  
100          I literally explain THAT to my students—  
101                   that if you can make this connection  
102                   this is going to really help you  
103                   because it really helped me a lot.  
104  
105  
106          I did get some confidence, though – eventually.  
107          It was in the mathematics for elementary school teachers' course.  
108          That course.  
109          That—there were two times in—  
110                   well, maybe three—  
111          in my entire college career that were specific turning points  
112          and it came from—  
113                   two of them were just from an instructor  
114                   saying something to me  
115                   and it changed  
116                   my whole outlook on myself—definitely.

117  
118       And one of those times was in that  
119               mathematics for elementary school teachers' course—  
120       and I went through that course  
121               and enjoyed it very much.  
122       It was fun, I thought, it was very fun.  
123  
124       At the end of that course I—  
125               in fact it was at my final exam—  
126       I got injured in an armed robbery—  
127       Yeah, I was working at Pizza Hut delivering pizza—  
128       I did that for eighteenth months—  
129       I was a single mom.  
130               I had a mortgage.  
131               And car payment  
132               And two kids to feed.  
133  
134       That's why I told you I had it so difficult.  
135       I was dealing with having my electricity turned off –  
136       I had to go to charity for food before.  
137       Ah, it was tough times—extremely tough times.  
138  
139       One time I remember my daughter—she had broke her—  
140               well we weren't sure,  
141       She fell off her bicycle at her father's,  
142               and this is when he still lived here  
143               and he took them for visitations.  
144       He brought her back  
145               and she kept tell me how badly her arm hurt

146 and I was concerned, you know.  
147  
148 I wanted to take her to the doctor.  
149 I called my boss, and he was like—  
150 (this is when I was at Pizza Hut)—  
151 He told me, “If you don’t come in, you don’t have a job!”  
152 So I went to work.  
153 I went to work—  
154 I had to, you know—  
155  
156 And, uh, the next day I took my daughter  
157 and it WAS broke.  
158 Her arm was broke.  
159 So yeah—there was some really  
160 tough decisions during that time period.  
161 Very tough—very, very difficult.  
162  
163 The robbery happened, like,  
164 the weekend before my final.  
165 And I didn’t go to the doctor.  
166 I didn’t have any insurance.  
167 I didn’t have any money.  
168 I didn’t go to the doctor.  
169  
170 And I got—I drove myself to—  
171 I hurt my leg is—where I was hurt and—  
172 I got into the classroom and—  
173 when I sat down and she—  
174

175 But then it was very difficult for me  
176 to get from my car to the classroom—  
177 physically.  
178  
179 My leg was just hurting me so badly.  
180 I got in there  
181 and she made the announcement to the class  
182 that if we were happy with our grade  
183 that we didn't have to take the final exam.  
184  
185 And, uh, I was ecstatic because I had an A and,  
186 of course, I didn't want to—you know,  
187 you don't want to take a final  
188 if you can stay with an A  
189 'cause you risk your grade, you know.  
190 I was no fool. (laughing)  
191 I would stick with my A.  
192  
193 But I knew I was not going to be able to walk  
194 back out—  
195 to my car and I didn't even know if  
196 I was going to be able to make it to the phone  
197 to call for help. (laughing)  
198 Uh, and, uh, a student allowed me to—  
199 use her cell phone and I called my sister—  
200 and I suppose everyone must of left—  
201 I guess all the students decided not to take the final  
202 because she was there—  
203

204 This instructor was there with me waiting—  
205 And she was asking me—she asked me  
206 had I ever thought  
207 of being a middle school math teacher.  
208 And I was like—“ME?”  
209 And she was like, “Yeah.”  
210 And I was like, “Why would you say *THAT?*” (laughing)  
211  
212 And she was involved in some program at Texas State University  
213 for middle school math teachers  
214 —and she was telling me  
215 that she wanted to recommend me to that program  
216 —and that, uh, you know,  
217 I would probably get some financial aid help—  
218 —and, you know, that it was a really good program—  
219 —and she was telling me that there was  
220 such a shortage of middle school math teachers  
221 —and that I could make more money  
222 —and blah, blah, blah.  
223  
224 And I was just ASTOUNDED!  
225 —that she even, you know, thought of me that way.  
226 I was just ASTOUNDED.  
227 —You could have knocked me over with a feather.  
228 I—  
229 NEVER  
230 —would have believed—myself capable of being—  
231 —a middle school math teacher.  
232 **NO WAY!**

233  
234 I thought well, gosh,  
235 if she thinks I'm good at math  
236 maybe I'm really good at math. (laughing)  
237 That was the first time—yeah—  
238 that I ever thought that—EVER.  
239  
240 That's exactly what I thought,  
241 And I had never had thoughts like that before—ever.  
242 And, uh, I did check out that program.  
243 I did apply.  
244 I was accepted.



---

*Cathi Tackles Developmental Mathematics*

**OUTLINE**

<u>Events</u>	<u>Lines</u>
<b>I. In the Beginning</b>	<b>1-101</b>
a. Girls don't do math	1-56
b. Unexpected help with math (the wild girl with pink hair)	59-72
c. A math breakthrough (the first epiphany)	74-101
<b>II. It's Gotta Get Better Than This</b>	<b>104-189</b>
a. A change is gonna come	104-120
b. Tough times	122-175
d. Sticking with a "A"	177-189
<b>III. The Second Epiphany</b>	<b>191-241</b>
a. Encouraging words (self re-assessment)	191-229
c. Acting on it	231-241

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*Figure 2. Outline for Cathi Tackles Developmental Mathematics*

### **Brief Discussion of *Cathi Tackles Developmental Mathematics***

Two things stand out in the early part of Cathi's story in relation to the first research question. First, she identifies the assistance from the wild young girl with pink hair, as well as the cooperative learning they were able to engage in together, as being instrumental in her learning developmental mathematics (see Figure 2, lines 59-72). Secondly, Cathi cites what she refers to as an "epiphany" when she describes the sudden insight and breakthrough of understanding about *general forms*—of fractions, equations, and so forth. Such quantum breakthroughs are not an uncommon phenomenon to those who either teach or learn mathematics. It is part of the reward of wrestling with new ideas and engaging the mind with new concepts. For if we are actually engaged with the material we are attempting to learn then, as Jensen (1998) has pointed out in *Teaching with the Brain in Mind*, "The brain continues to process information ... long after we are aware ... as a result, many of our best ideas seem to pop out of the blue" (p. 46).

Gee (1991) refers to stanzas (or verses) that "fall into related pairs" (p. 23) as *strophes*, a term borrowed from Greek tragedy designating dialogical stanzas, verses, or simple conversations. The idea of *strophes* as related pairs may be applied to lines or phrases as well. Cathi's use of strophes to convey meaning can be noted in a number of places. The stanza in lines 92-95, for example, pairs with the stanza in lines 97-101 to communicate the importance of the epiphany of understanding *general forms* to Cathi, on the one hand, and the importance to her of incorporating it into her teaching style on the other. Strophes as related pairs of lines or words can be just as effective, perhaps more so, in communicating meaning, thought, and emotion. For example, her surprise at

the suggestion she could become a middle school mathematics teachers was expressed in lines 224-227 when she said:

And I was just ASTOUNDED!  
                   —that she even, you know, thought of me that way.  
 I was just ASTOUNDED.  
                   —You could have knocked me over with a feather.

Not only does she utilize the *strophes*, or pairs of lines comprising the stanza, but she also expresses her surprise by the double use of the word *astounded*. Tannen (1990) concurs with Gee in emphasizing the importance of identifying such repetitions and, furthermore, emphasizes that “when any oral discourse is transcribed, its comprehension is facilitated by transcription in (poetic) lines rather than undifferentiated (prose) blocks” (p. 19). This, too, is in agreement with Gee and that, in fact, is the reason for this study’s methodological choice.

### **The Impact of Faculty or Institutional Behaviors and Attitudes**

The second research question was concerned with the impact of faculty or institutional behaviors and attitudes on these former developmental mathematics students. The short answer is that the impact was profound. Elaboration of that point, honestly, doesn’t add all that much to understanding the point. What does is *the story*. When the participants tell their story, then somehow our senses are engaged in ways that lists of facts cannot accomplish. It is likely that at one time each of us has spoken, or heard spoken, the words, “I *hear* what you’re saying.” Perhaps equally likely we’ve said,

“I *see* what you’re saying.” But a good story takes us even further, to the point where we “*feel* what you’re saying.” Concerning stories, Rossiter and Clark (2007) have pronounced, “We tell them, we live in them, our views of reality, of life itself, are shaped by them in ways beyond our awareness” (p. 3). It is how we see ourselves and how “we make sense of our experience” (p. 3). What impact do teachers have on adult students? Let’s have a story.

### *Meet Eileen*

A few years ago, at age 30, Eileen—now 46—found herself making some tough decisions. After 12 years of a difficult marriage she was going through a bitter divorce from a ‘deadbeat husband’ who would provide no assistance—financial or otherwise—with the upbringing of their 7 year old daughter. Eileen was determined, however, that these major life changes would include enrollment at the local community college—because she needed to qualify for better jobs and, perhaps more importantly, she had been denied the opportunity for college for years while catering to her ex-husband’s “laziness, failed pipedreams, and male-insecurities.” It was her turn now. However, like Jim and Cathi, Eileen needed money. She would have to work two jobs in order to pay for living expenses, childcare, and tuition. Money was very tight, her academic skills a bit rusty (put mildly), she felt fragile—and she was scared.

Today, Eileen having earned a bachelor’s degree, a master’s degree, and a Ph.D. is having a successful career teaching and doing educational research. In the interim between her master’s degree and her doctorate (roughly a 10 year period) she ran a highly successful tutoring center at a large mid-Atlantic university. She is a well-

respected scholar, proficient administrator, and well-loved teacher. She has written numerous articles that have been published in professional journals and she has contributed chapters to a number of respected textbooks. She has been published, and presented papers, both domestically and internationally. A number of her articles have won high praise from leaders in her area of expertise and some have been singled out for special awards and recognition. In additions to educational publications, Eileen has also published other writings including her own fiction, nonfiction, and poetry.

She has also won awards for her outstanding tutoring programs, which have been resounding successes and have positively impacted the lives of many young people. Furthermore, as a teacher, she has consistently received some of the highest ratings from her students and her supervisors, alike. Professionally, she is esteemed by her colleagues and is very well-respected; she is highly sought after for academic consultations, contributory writings, and conference presentations. But you never would have known these things were in her future back on the day she first stepped into a developmental mathematics classroom.

1       *Eileen's First Day*

2

3       Nobody in my family ever went to college—

4               —it wasn't expected—

5       So, I got married right after high school.

6

7       And, um, nearly twelve years later,

8               when it was time for a divorce,

9       I uh, knew I had to support my kid.

10       I had to work and I couldn't

11              live on minimum wage, so—

12       I was afraid, actually, of uh, of leaving [her husband],

13              but I wanted to, I had to—

14

15       So I knew I had to go to college,

16              and it had been fourteen years

17              since I'd had math in high school,

18              and all I took was Algebra, anyway.

19              That's all I had to take.

20

21       So, um, so they tested me, and I, I tested

22              out of the Arithmetic, or

23              whatever it was,

24              there were those lower classes...

25              I knew how to do that kind math

26              without a problem,

27       But I didn't remember Algebra, so

28       I had to take Developmental Algebra.

29

30 My very first experience  
31 in the Developmental Algebra class, um,  
32 was the first day of class.  
33 I went into class and I sat down, and  
34 I sat up in the front row, like I always did, and  
35 I listened attentively, and the woman was  
36 talking about how it was a self-paced course,  
37 and um, my mind is moving fast,  
38 and I'm thinking, if this is self-paced then  
39 I can get it through....through it, then  
40 I can either save money  
41 or save time,  
42 or something, so—  
43  
44 After she had talked about how it worked,  
45 how you did the tapes and took the tests,  
46 and so on and so forth, um,  
47 I raised my hand and I asked her—  
48 if, uh,  
49 if we finished early,  
50 if we could go ahead and start the next semester's work, or  
51 if we just had to stop until the next semester.  
52 And, and—  
53 She looked down at me, and uh,  
54 I was working hard,  
55 I was working at Paine-Webber and  
56 I was wearing a suit and heels, and  
57 I looked professional, and  
58 I was twenty-eight years old, and

59       She looked down at me, and  
60               she said, uh, “Don’t worry, you’re not gonna finish early.”  
61               In a very condescending tone, and  
62               I almost cried—still almost cry  
63               when I think about it.  
64  
65       And I sat there till the end of class and  
66               I left, and  
67               I felt humiliated,  
68               I was embarrassed when she did that to me, and uh... so  
69               I went home and I almost didn’t go back,  
70               I almost just didn’t go to college.  
71               I wrestled with it,  
72               because I thought,  
73               “I can’t, I can’t deal with this, and  
74               it wasn’t ..  
75               it wasn’t hurt pride.  
76               It was a real FEAR that  
77               I wouldn’t  
78               be able  
79                               to do the math,  
80       And I was, uh, may have seemed  
81               like I was confident to her, or something,  
82               but I wasn’t at all, but  
83       I knew I would put out the effort, so—  
84       So that was bad.  
85       But, I DID go back.  
86       I decided I wasn’t going to let her  
87               stop me from getting an education.



---

*Eileen's First Day*

**OUTLINE**

<u>Events</u>	<u>Lines</u>
<b>I. The Decision for College</b>	<b>1-28</b>
a. Background	1-5
b. The need for college	7-19
c. Testing into developmental mathematics	20-28
<b>II. First Day of School</b>	<b>30-79</b>
a. Introduction to the course	30-46
b. Posing a question	47-58
c. Feeling shot down	59-79
<b>III. Who's the Boss</b>	<b>81-88</b>
a. Regaining composure	81-84
b. Overcoming the fear	85-88

---

*Figure 3. Outline for Eileen's First Day*

### Brief Discussion of *Eileen's First Day*

Eileen was already insecure and scared. Going through a divorce is not easy. But she had a plan. She was carrying it out. She was sitting in a college classroom, albeit a developmental mathematics *college* classroom, which no one in her family had done before. She was there. She was thinking. The intensity with which Eileen thinks and plans is evident by the sheer number of repetitions she uses to tell this short story. In the short space between lines 9 and 19 (see Figure 3), you find:

I *had* to support my kid...  
 I *had* to work...  
 I *had* to..  
 I *had* to go to college...  
 [Algebra] That's all ... I *had* to take

And you also find:    *I wanted to...*  
                               *I was afraid...*

This fragile young woman was under pressure. She **HAD** to. But she was terrified.

What tone or insinuation might have been in the teacher's words doesn't appear immediately—at least not to me. What does appear immediately is how those words impacted Eileen. And who among has hasn't at some point in our lives been stunned into a humiliated silence, waiting for the escape hatch to appear in order to take flight and never return. But Eileen HAD to return.

She did leave. Who wouldn't? She was *embarrassed* and *humiliated*. Consider the strophe: “I *almost didn't* go back” and “I *almost...didn't* go to college.” But she did. She had to. Eileen may have appeared confident. Well, she tried to appear confident. She had to. That was part of her menial job at Paine-Webber. She tried hard to dress well,

carry herself well, in order to appear confident—not arrogant—confident. Now she was shaken. It wasn't hurt pride. It was the fear again. She was realizing it. She was afraid.

*“It was a real FEAR that I wouldn't be able to do the **MATH**.”* She almost didn't go back. She almost didn't go to college. What an incredible loss that would have been for all of us! *“But, I DID go back.”* She had to. In spite of her developmental mathematics teacher, she **had** to. *“I decided I wasn't going to let her stop me from getting an education.”*

Just as a teacher's words can create stress for an adult student, so too can words create hope and open the doors of the mind to new possibilities. Moreover, the messages conveyed by individual teachers and the messages conveyed by an educational institution as a whole possess the potential for fostering both good and ill, hope and despair, freedom and oppression. Cathi's story also sheds light on the ways the faculty or institution can impact a student by means of attitudes or behavior:

1           *Cathi and Graduate School*

2

3           And so, I kept missing school ... because

4                   this boy was sick and...

5           I had been taking him to the doctor, you know.

6           Took him to the emergency room and

7                   they decided that he had strep and—

8                   they gave him an injection—sent us home.

9

10          Two days later he had 106 temperature and

11                   he was hallucinating.

12          I put him in a tepid bath—I'm a nurse that's what you do—

13                   and rushed him to the emergency room

14                   and they didn't believe me

15                   because his temperature was down

16                   by the time I got him there, of course,

17                   because I had put him in a tepid bath.

18

19          Uh, you know, a kid hallucinating with fever

20                   the next step is seizures

21                   and possible brain damage.

22

23          They still couldn't figure what's wrong with him,

24                   but I was having to give him medication

25                   every two hours around the clock

26                   to keep his temperature below 104.

27

28          Two days later still sick, he woke up—

29                   —couldn't even stand up.

30                                Screaming—  
31                                —fell on the floor—six-year-old boy.  
32  
33        He got admitted that night. I took him to a—  
34        different hospital—different emergency room, and  
35                        —he was on the verge of kidney failure,  
36                        —his liver was enlarged,  
37                        —he had scarlet fever, and  
38                        —something else that they couldn't figure out.  
39                        —his white blood count was way off.  
40        Sick,  
41                        sick,  
42                                sick,  
43                                        sick—kid.  
44  
45        He was in that hospital for five days.  
46        He did have scarlet fever, but  
47                        he also had a virus that  
48                        attacked his bone marrow.  
49        They thought he had cancer.  
50        Yeah, they called an oncologist in.  
51  
52        My [math] instructor ... when I got back,  
53                        he was very sweet to me,  
54                                he would even let me go to his office and  
55                        get his lecture notes,  
56                                his own personal lecture notes, and go  
57                        make copies of 'em and then  
58                        take them back to him.

59  
60       He would let me do that, and  
61       I was keeping up actually and  
62               when I got back—he gave me the option.  
63       They were having the exam  
64               like the day or so after I got back.  
65  
66       And he said, “Well you have the option.  
67               You can take this exam or you can wait and  
68               we’ll count the final exam twice.  
69               You can count it for this grade and that grade.”  
70  
71       And I didn’t take the—I opted not.  
72       I didn’t take that exam. I was scared to death.  
73  
74       It was the first exam in that class  
75               and I told him I’d count my final twice.  
76       And I made an 87 in that course—overall  
77               and he just about kicked me.  
78  
79       He said, “If you would’ve took that first exam  
80               you would’ve had an A!”  
81  
82       I was like, “I was so scared!” (laughs)  
83       And it turned out that—he was the second guy,  
84               —the second person that ever said anything to me.  
85       Because I had to take Calculus-one and  
86               I, ... I enrolled under him.  
87       I thought well if I could pass him with Pre-cal

88                   then maybe I can pass him with Cal-one  
89           and I think the guy's a very, very good instructor .  
90           So I enrolled with him again  
91                   —scared to death—with Cal one.  
92  
93           I was really scared then  
94                   —because I had a lot on mind.  
95  
96           One of the instructors from that semester,  
97                   she dropped me because of my boy's illnesses.  
98           All the other instructors bent over backwards  
99                   to help me stay up and I was staying up.  
100  
101           Guess what course I got dropped from—the instructor  
102                   —would not work with me,  
103                   —would not work with me.  
104           It was educational psychology!       (laughs)  
105  
106           Gary: *Something a little ironic about that.*  
107  
108           A little bit, I was so upset with her because  
109                   she didn't even give me a chance to prove myself.  
110           And I had a pretty fair amount of background,  
111                   I mean I had taken  
112                           a psychology course,  
113                           a sociology course,  
114                           a human growth and development course.  
115           It wasn't like all these things were bringing  
116                   new concepts to me.

117       You know, anyway  
118               —she didn't even—  
119               —she wouldn't even—  
120       give me a shot,  
121               so I got dropped.  
122  
123       And that caused me to be  
124               in danger of losing my financial aid.  
125       Because they told me if I dropped or failed four hours,  
126               I would—period, no more financial aid.  
127  
128       Calculus was a four-hour course,  
129               I was scared to death.  
130       Because I thought if I enroll in this course  
131               and I don't make it,  
132       I'm out of school forever. You know?  
133  
134       Because I would be stuck with an LVN salary  
135               and I couldn't even support my kids,  
136       I mean it wasn't even just my education on the line,  
137               it was my home (laughs), and everything. You know?  
138       So I was again hyperventilating...  
139  
140       Well, I was in Cal-one WHEN HE SAID IT—  
141       It was in Calculus-one THAT HE SAID—  
142       I took the course with him and  
143               it was the day of the final exam.  
144       I was the last student in the room  
145               taking the final exam.



146       And when I handed it to him,  
147               HE SAID, “Did you ever think about grad school?”  
148  
149               And I said, “Me?” Again,  
150               I was like, “No, I haven’t ever thought about it.”  
151       And he said, “You should.”  
152               And I said, “Why?”  
153       And he said, “Because it’s not that you’re  
154               only good at calculating this,  
155                       but you understand the theory behind it—  
156                               and that’s rare.”  
157  
158       And I was like, “Wow! Really?”  
159       And so I again never would’ve  
160               thought that of myself—  
161               didn’t realize that—  
162       I was very surprised that he had said that to me.  
163  
164       “Did you ever think about grad school??”  
165       That right there—did it.  
166       When he said that to me.  
167  
168       At that point I was working on a degree  
169               in interdisciplinary studies  
170               with a concentration in mathematics.  
171  
172       I was going to be a middle school math teacher.  
173  
174       And when he said that, I started thinking ...

---

*Cathi and Graduate School*

**OUTLINE**

<u>Events</u>	<u>Lines</u>
<b>I. My Child is Very Ill</b>	<b>1-50</b>
a. Fever and hallucinations	1-26
b. In the hospital and SICK	28-39
c. Very, very SICK	40-50
<b>II. Finally, Back at School</b>	<b>52-80</b>
a. The good math teacher	52-64
b. Exercising options	66-77
c. Could have done better	79-80
<b>III. It Happened in Calculus-One</b>	<b>82-175</b>
a. Round 2 with the good teacher	82-91
b. The other teacher	93-121
c. Losing financial aid?	123-139
d. That's when he said it	141-157
e. Re-defining self for math grad school	158-175

---

*Figure 4. Outline for Cathi and Graduate School*

### **Brief Discussion of *Cathi and Graduate School***

It was clear that Cathi had replayed these experiences over and over again in her own mind. No doubt she had struggled to make sense of the events in her experience, especially the painful ones. I noticed that Cathi possessed an order and timing in telling me her stories—she resisted my attempts to ask any follow-up questions that disrupted the flow by suggesting we move tangentially or that threatened to change her pace by quickening or slowing the storyline. She had clearly reflected forcefully and frequently on the story she told and it was not to be tampered with. According to Rossiter and Clark (2007), “Perhaps most relevant in relation to adult learning is the empowering realization that to critically reflect on one’s life story is to claim the authority to rewrite it” (p. 25). That Cathi had reflected on and rewritten her story should not be construed as meaning that she sounded rehearsed; she did not. She simply seemed determined to tell the story the way she wanted it to be told.

Cathi has overcome much, but she’s experienced too much to think that difficult times may all be in the past. She draws strength and solace from remembering what she has successfully come through: incredibly difficult times—financially and otherwise, frightfully ill children, betrayal by a spouse, betrayal by a sister, injustice at home, at school, and in life. Like Eileen, Cathi has known fear (note how frequently she was “scared” – lines 72, 82, 91, 93, and 129 of Figure 4). Interestingly, she did not use the term in connection with her sick—incredibly sick—son; she used it in connection with those things that might disrupt the long-term plan. That plan was for the Cathi that she wanted to become. Cathi longed for her life to be transformed. She was so intent on it

and focused in one direction—she had to be jolted into looking in a new direction—where she could then see her greater potential. It didn’t take much—just a few words from an alert caring mathematics teacher.

Those few words Cathi remembers vividly. Those few words are permanently set into telling of her life story. She excitedly anticipated telling those words to me (lines 141-148):

Well, I was in Cal-one when **HE SAID IT**—  
 It was in Calculus-one that **HE SAID**—  
 I took the course with him and  
                   it was the day of the final exam.  
 I was the last student in the room  
                   taking the final exam.  
 And when I handed it to him,  
                   **HE SAID, “*Did you ever think about grad school?*”**

As before, she emphasizes the strangeness of the idea—“*I again never would’ve thought that of myself*” and “*I was very surprised that he had said that to ME*” (lines 160-163). But those were words Cathi needed; words she could use. They were words of liberation, challenge, and possibility. Cathi decided to keep them (lines 165-167):

**“*Did you ever think about grad school?*”**  
 That right there—did it.  
 When he said that to me.

Every participant in this study had a story about the impact of a teacher’s attitude—reflected by behavior or words. Usually, it involved something that was said by the teacher. Sometimes it was negative and sometimes positive, but every time it was

profound. I don't know that it is possible to overstate the impact of an educator's words on his/her students and on adult students, especially.

### **What More Can We Learn?**

The third research question for this study was concerned with what more can be learned about the educational experiences of the participants that can inform future research and practice. This will be explored more fully in the next chapter. We will, however, consider some of possibilities that the stories suggest. Additionally, we will address here that portion of the first research question we have so far postponed, namely, how has their experience in developmental mathematics helped shape their career?

#### *Meet Chester*

Chester is a 28 year old male. He is married and has one small child. After high school he went to community college where he took developmental mathematics. He continued on to get a B.S. degree in biology. He then took a job at a grocery store for the next 4 years. After getting injured stocking shelves he began to consider other career options. Chester found an alternative teacher accreditation program that would cover the costs of a master's degree in education in exchange for a 3 year commitment to teach mathematics and/or science in grades 4 through 8. Since the community's need for additional qualified mathematics teachers exceeded its need for science teachers, Chester was assigned to a middle-school mathematics teaching position after completing additional mathematics courses in order to fulfill the program requirements.

1       ***Chester and the Impact of Developmental***

2       ***Mathematics on Teaching Philosophy***

3  
4       Because of being in that class and  
5               understanding or getting a feel for  
6               just how much my deficit was.  
7       Trying to get into college, and, and taking what colleges  
8               around the U.S. feel that you should be at this level—  
9               College Algebra when you come in, um.  
10      Just having that notion in my head would,  
11             every day when I would go into the classroom,  
12             would motivate me and push me  
13             to try to get some of these kids  
14             that are not understanding it, you know.  
15  
16      I——try to get them—to come for tutoring,  
17      and——try to get them— to do some sort of homework—  
18             or, you know, just look at it, just read.  
19             Read, you know, the algorithm of  
20             how you're supposed to do this...  
21             Just understand what you're supposed to do  
22             when you see it.  
23             I don't care about the right answer—  
24             just understand what you're supposed to do,  
25  
26      Because, you know, it, it seems like, you know, it's,  
27             and of course, I haven't done any research on it,  
28      but it seems like, you know, as, as a nation,  
29             what I hear and what I see—

30       The U.S. is becoming more and more gapped  
31               as to being college-ready right out of high school.  
32       And it doesn't matter where you are,  
33               you can be in northern suburbia with ritzy, ritzy parents,  
34       or you could be, you know, Texas ghetto-land USA, you know,  
35               and still, that deficit, that huge deficit is there.  
36  
37       So, um, the other thing that,  
38               that would always pop into my head is  
39       how many of my friends  
40               gave up on their college, their higher learning  
41       because of all the remedial classes they needed to take.  
42  
43       And, the, the first thing they would say is,  
44               "I'm not getting credit for this?  
45               Oh, forget it.  
46               I'm not gonna go.  
47               It's not worth it.  
48               I'm gonna have to do two years of remedial courses  
49               just to get myself to the point  
50       where I could take college courses and  
51               go another four years.  
52       That's six years, you know?"  
53               So that, you know, also went through my head,  
54  
55       But I'd tell some of these kids that  
56               I would pull to the side, and say,  
57               "Look, you don't want to be  
58               in this situation and get to college.

59                   You want to be in and start taking credits  
60                   so you can finish.”  
61  
62       So, I think it had quite a bit of an impact,  
63                   and having a better understanding of  
64                   where these kids are, and  
65                   where they need to get to...to be able  
66                   to succeed, you know, at a—at a—higher level.  
67  
68       I also try to tell them, you know, to... to get a tutor,  
69                   several tutors if you need to, um, and  
70                   to understand that math is logic.  
71                   I mean, pretty much all math that  
72                   you do has logic behind it.  
73       They, there isn't any math that I've encountered that  
74                   you just pull numbers out of the air and it works.  
75  
76       So, if you get an understanding of the algorithm  
77                   of what you're supposed to do,  
78                   the order that you're supposed to do it in,  
79                   you should be okay.  
80  
81       And I think that's where a lot of  
82                   students have a deficit,  
83       because there's not enough time in public school  
84                   to drill it in,  
85       you know, “If you see this type of problem,  
86                   and you're looking for this, these are the steps.”  
87       It's more like, “You do it like this.”



88                   and there's no explanation behind it.  
89  
90       And I myself was sort of the product of that,  
91                   because some of my teachers never took the time to say, you know,  
92       "This is what you're supposed to do,  
93                   like the diagram tells you – do this, this, then this."  
94  
95  
96       I do feel, I do feel a whole lot more confident.  
97                   I do feel that I, and especially being...  
98                   it's kind of funny, in teaching.  
99       You know, this whole last year of eighth grade, it,  
100                  it reinforced a lot of the math that I sort of forgot  
101                  but I kind of still knew.  
102       So, it's brought a lot of it to the forefront again,  
103  
104                  And that's what I keep instilling in the students,  
105                  —also, you know, that if you don't  
106                  go over it and practice it,  
107                  you're gonna forget it. You know?  
108  
109       And, even I was at fault with some of that, you know,  
110                  I'd have to read the chapter the night before—  
111       and go, "Okay, how do you do volume again?" (laughs)  
112                  Because I, you know, because—  
113                  you don't use it, I mean, you know—  
114                  You really don't ever use that in everyday life, you know?  
115  
116       So, but as far as taking higher math,

117                   it may be something that I'll pursue,  
118                   and, who knows?  
119                   I mean I, I've uh, I just—  
120                   throughout this past year  
121                   I've gained a bigger,  
122                   greater respect for mathematicians,  
123                   and what math can do for your life, and just,  
124                   what you can do with math in general.  
125       So, I may end up pursuing a degree in math at some point,  
126       I don't, I don't know if I would,  
127  
128       But I do know  
129       I do have a better understanding of, you know, of why—  
130       You know, my fifth grade teacher said,  
131                   “You need to do your math!” And, you know—  
132       Why my mom sat us down, you know,  
133                   myself and my two sisters,  
134                   when we, we were in elementary school and  
135                   we had to sit at the table and  
136                   do our multiplication tables, you know, until  
137                   we memorized them.  
138                   And back then we did it because  
139                   we were told to do it.  
140                   But it was like, “Why do we have to do this?”  
141                   You know? And, you know, now.  
142  
143       When I see sixteen/seventeen-year-olds struggling with,  
144                   “What's six times seven, or five times five?”  
145       And they have to sit there and think a second—

146                   Where it comes to me, you know,  
147                   in a blink of an eye, it's like, Wow.  
148  
149       I, since I grew up, I'm in a school that's very uh,  
150                   social...socially-economically very similar  
151                   to what I grew up.  
152                   So, I felt that I could connect with them and,  
153                   and show them that,  
154                   Hey, if I can do it, you can do it.  
155  
156       You know, and I, I use my sister a lot,  
157                   my younger sister as an example,  
158       'cause she's a lawyer,  
159                   and I have a few students. I—  
160  
161       I recently did a kind of different assignment.  
162       I wanted to see where they wanted to go  
163                   or were heading, and  
164       I had three or four of them who said  
165                   they wanted to be lawyers.  
166  
167       So, I offered to try to set them up with my sister,  
168                   for her to have a conversation with them.  
169       Since she grew up and went to the same schools I did,  
170                   and you know, that were, you know, uh—  
171                   socially and economically, you know,  
172                   pretty low, you know, too...  
173       So they could see somebody that, hey—  
174       This person made it out; we can make it out.

---

***Chester and the Impact of Developmental  
Mathematics on Teaching Philosophy***

**OUTLINE**

<u>Events</u>	<u>Lines</u>
<b>I. Now That I Teach</b>	<b>1-53</b>
a. Lessons learned	1-14
b. An emphasis on algorithms	16-24
c. The socio-economic gap	26-35
d. Talking to my friends	37-53
 <b>II. The Impact on Teaching</b>	 <b>55-114</b>
a. Sound a warning	55-60
b. Impact on my thinking	62-79
c. The lack of drill	81-93
d. Gaining confidence	96-114
 <b>III. Looking Ahead</b>	 <b>116-174</b>
a. On pursuing a math degree	116-126
b. Lessons from the past	128-141
c. Providing role models	143-174

---

***Figure 5. Outline for Chester and the Impact of Developmental  
Mathematics on Teaching Philosophy***

## Brief Discussion of *Chester and the Impact of Developmental Mathematics on*

### *Teaching Philosophy*

Chester is still in the process of getting comfortable as a mathematics teacher (see Figure 5). His first love, academically speaking, is science—biology and chemistry, in particular. He shares very clearly his understanding that mathematics is important—it is important to academic success and it is important to career success. Although he must have used a variety of mathematics in his science courses and in his job with the grocery store, he doesn't appear to be quite as convinced of the importance of mathematics to life in general (lines 111-114):

“Okay, how do you do volume again?” (laughs)  
 Because I, you know, because—  
 you don't use it, I mean, you know—  
**You really don't ever use that in everyday life, you know?**

Nonetheless, Chester has made efforts to fill in his own knowledge gaps (line 110) and to impress upon his students the importance of skill acquisition (lines 62-79), of practice (lines 104-107), and of taking initiative (lines 55-60). His concern for his students is evident in his views on their socio-economic situation (lines 26-35 and 149-154) and the actions he takes to help them lift themselves up through exhortations (lines 16-24) and through role models (lines 149-174). He tells them, “If I can do it, you can do it” and attempts to cause them to think, “This person made it out; we can make it out.”

Clearly, Chester's teaching has been impacted positively by his experience in his developmental mathematics course—deepening his sense of mathematics' importance,

awakening his compassion for young kids oblivious to what the future will require of them, and motivating him to take positive steps in light of his heightened awareness.

What more can we learn? From stories such as Chester's, we can learn something about the reasons for some of the frustrations of first-year or novice teachers. It is evident that Chester's approach to teaching relies heavily on algorithms (lines 19, 76, and 86). Interviews such as this one with Chester, in the hands of a knowledgeable compassionate curriculum chair, could provide valuable information about how to move him from a behaviorist to a more constructivist approach to teaching. This might garner some improved student responses and performances, thus alleviating some of his frustration. As a first-year teacher, Chester is doing what many first-year teachers do—he teaches how he was taught. Unfortunately, the long-term goals of the Reform Movement have yet to trickle down very far into the daily routines of many mathematics classrooms. Chester could benefit greatly from a few role models who placed conceptual understanding ahead of procedural understanding in the classroom.

Chester's story was perhaps a little drier than those of the other narrators. That is, perhaps, because he dealt almost entirely with mathematical topics whereas the others shared much more of the personal issues and struggles accompanying their experience. Still, from all such interviews we can learn about these individuals—their needs and struggles as present-day teachers, as well as what they experienced as students. We can also learn more about the psychic scars and raw emotions that they still carry with them. For example, let's revisit Jim as he discusses being of Hispanic descent but having Spanish as his second language.

1       *Jim Talks About Learning Spanish*

2

3       English [was my first language], and my parents,

4               I guess you can say,

5               debated whether letting us

6                       learn the Spanish correctly, uh,

7               but my dad's from Mexico!

8       That's the main thing, it's—he's like, you know what?

9       He wasn't so sure, I think,

10                               —because he saw a lot of

11       Uh, what is it—racial tendencies?

12       I guess you could say, where—

13                               —because you speak Spanish,

14       they put you in the back,

15                               —because you speak Spanish

16       they do this,

17                               —because—

18

19       And he didn't want really us to go through—

20       But at the same time, he didn't want us to—

21                       to lose any of our heritage.

22

23       Because we would go to Mexico

24               at least once every two years.

25       And we'd go visit there, we'd go visit, you know,

26               his sisters and my cousins, and my—

27               whatever family we have down there in Mexico.

28

29       And, he'd make a point of it, and

30                   at first, I—at first it felt funny  
 31                   —because if you talk too much Spanish here,  
 32                   they laugh at YOU,  
 33                   and they make fun of you  
 34                   —because of the way you talk in your English.  
 35  
 36       Okay, what we discovered, and  
 37                   what we felt was reverse discrimination  
 38                   —because when we went to Mexico  
 39                   it's like ... they would make fun of us  
 40                   —because we'd try to talk  
 41                   and we couldn't say what we wanted to say  
 42                   —because we didn't—  
 43                   we didn't have the proper —  
 44                   I guess—knowledge of the language.  
 45  
 46       And, like, I remember  
 47                   the thing that sticks out in my mind is  
 48                   my sister was eleven years old  
 49                   —and we were learning—  
 50                   I already knew how to count in Spanish.  
 51                   Because I—my dad would get a—  
 52  
 53       I don't know if you know what they are,  
 54                   *La Vistas*, the novellas?  
 55       They're like, uh, it's like a magazine.  
 56                   But it, you know, it's like a magazine comic.  
 57       It's got a story. It's like a soap opera.  
 58                   I would get the funny ones,



59                               the cartoon ones, and read ‘em,  
60  
61       And I taught myself pretty much  
62                               how to read and interpret it a little bit,  
63                               And my sister was so excited  
64                               I was reading a comic.  
65  
66       And my sister, they asked her, “How old are you?”  
67                               They were talking to her in Spanish—my cousins—  
68       And my sister was like, “Eleven.”  
69       And they looked at her like, “Well, what are you saying?  
70                               We don’t understand you.”  
71       And my sister was like, “I’m eleven.”  
72  
73       And my mom looks at her and she goes, “They’re asking you,  
74                               but they want you to answer in Spanish,  
75                               they don’t know what you’re saying.”  
76       And my sister was like, “Oh.”  
77  
78       And she kept thinking—  
79                               She was like, “Okay.”  
80                               She was counting in Spanish, “Uno, dos, tres—”  
81                               but all she could get to was ten.  
82       And then she goes, “Well, I know eleven is two ones.”  
83       And she goes, “I’m uno-uno.” —to, to compensate.  
84       And my family laughed!  
85       And after that is when I made a point to learn the rest of them,  
86                               not just up to ten.  
87       But, but that was a fun time—I remember a lot of the things.

88  
89 But it was funny because it is—it is—  
90 When you go to another place from here  
91 it is reverse discrimination,  
92 Because, you see people here and—  
93 you don't think much of it,  
94 Because they're making fun of other things, but yet  
95 when you go to where they're from,  
96 whether it be Mexico,  
97 or whether it be Canada,  
98 anywhere else you go.  
99 When you go talking there  
100 they want you to talk their language  
101 so that way, I guess you could say so,  
102 they get some justification out of making fun of you  
103 like you make fun of them.  
104  
105  
106 I had a, I did a project for my BBL class  
107 and we did a lot of cultural things.  
108 and we did, we had to do a project  
109 on somebody, or anybody  
110 We did it on a friend of ours  
111 and in talking to her—her mom was from Mexico—  
112 and she was telling us how it was—  
113 when she was growing up here.  
114  
115 So—  
116 They decided—I think she came up here

when she was thirteen—  
They decided, when they first got married,  
her and her husband, that—  
They would not teach their kids Spanish.  
  
And today—they see that's the biggest mistake they ever made—  
not teaching them, because  
you know, the way everything is nowadays  
—bi-lingual—you know—  
Everywhere you go, whatever you do, you know,  
To get a better paying job nowadays  
you have to know how to speak Spanish.  
  
My father-in-law is Cuban and—  
His kids know very little Spanish.  
I don't know why.  
They're my in-laws.  
They know very, very little Spanish.  
  
They know just a few words here and there—  
eh, pretty much, the cuss words.  
But it's like, he laughs at me when I'm talking Spanish—  
because he knows that's not the proper way to say it,  
“The proper way is—”  
And then, when he's trying to say something in English.  
I'm like, “That's not the proper way to say it!”  
You know, two can play that game.  
You wanna correct my Spanish,

146 I'll correct your English.  
147 And he'll just sit there and we'll just laugh  
148 just kick back and get a kick out of it.  
149  
150 It's fun.  
151 But, it's funny how  
152 to see other people correcting you  
153 even though they're not from that country itself.  
154 He's, like I say, he's from Cuba  
155 but yet he's teaching me how to talk Spanish.  
156 I'm like, "Oh, okay."  
157 He'll be like, "No, you don't talk proper Spanish."  
158 And I'm like, "No, I talk Tex-Mex—  
159 —that's what I learned—  
160 —and that's what I'm staying with!"

---

*Jim Talks about Learning Spanish*

**OUTLINE**

<u>Events</u>	<u>Lines</u>
<b>I. Mexican Heritage</b>	<b>1-45</b>
a. Spanish is my second language	1-21
b. Visiting relatives in Mexico	23-27
c. Being made fun of	29-44
 <b>II. Are We Having Fun Yet?</b>	 <b>46-103</b>
a. Self-taught Spanish	46-64
b. Sister gets dissed	66-86
c. Fun, fun, fun	87-89
d. Everybody's doing it	90-103
 <b>III. Friends and Family Fun</b>	 <b>106- 160</b>
a. No Spanish for the kid	106-128
b. The in-laws make fun	131-157
c. Don't mess with Tex-Mex	158-160

---

*Figure 6. Outline for Jim Talks about Learning Spanish*

### **Brief Discussion of *Jim Talks about Learning Spanish***

Jim had told me that he was of Hispanic heritage so the question I had asked was if English was his first language—which he tells me it was. The rest of the story was simply his voluntary explanation of his relationship to the two languages, especially Spanish (see Figure 6 for outline). Jim uses the words *fun* or *funny* 11 times in this short narrative. Yet there was nothing funny about any of it. It is clear from the transcript that he has been hurt (emotionally) by friends and family who have made fun of him (and his sister) for their skill or accents with the Spanish language. Within the purview of this study's overarching theme—what can we learn—the possibilities appear quite extensive. Jim told this story with lively tones and smiles, yet those belie the pain that he was actually communicating to me—a pain that I did not appropriately recognize until I listened and coded the transcript.

Tannen (1990) has noted that in literary works, such as drama, repetition is used deliberately in order to play up that repetition for effect. Spoken language in use, on the other hand, is “uttered fairly automatically” (p. 27). Jim's repetition of the word *fun* typically follows the telling of a painful event within the context of the whole story, and strikes me as an effort to smooth out or smooth over the event as if it was all done just in fun. That borderline between “having fun with” someone and “making fun of” them is a much more well-defined boundary for the object of the joke than it is to those who perpetrate it.

Tannen (1990) insists that “conversation is poetic in its structure as well as in its effect” (p. 30). This, I believe, is amply illustrated by the examples provided here.

Moreover, the speech stream with which the storyteller narrates his/her story operates “on systems of coherence in which form and meaning intertwine” (p. 30). Although, Jim called these experiences *fun*, it is clear that they were anything but. Utilizing narrative analysis, techniques like those offered by Gee (1999) and Tannen (1990) offer the possibility of learning more about not only our former (and current) developmental students’ experiences, but of learning more about the students themselves.

### **Summary of Overall Results**

Since they were particularly illustrative narratives, we have looked at stories pulled from four representative transcripts. However, all the interviews made significant contributions to the overall results. As mentioned previously, while looking for data within and across participants it was from time-to-time advantageous to use constant-comparison, categorization, and contextualization to varying degrees (Glaser & Strauss, 1967; Lincoln & Guba, 1985; Riessman, 1993) while shifting between form and content, categories and context, in order to understand the meaning that the narrator is conveying about “the world, identities, and relationships” (Gee, 1999, p. 99).

Nonetheless, some remarks about the findings for each of the three research questions are in order as they relate to all 13 participants as a group. First of all, concerning the primary contributors to their success in mathematics, the principal responses were (i) persons, (ii) background, (iii) opportunities. These responses, as indeed the responses across the three main research questions, were not mutually exclusive. As with Jim, early in this chapter, the person was tied to the opportunity in

that his counselor at DARS, Gina, was both the individual he identified as being key to his success and instrumental in making the opportunity (of financial support) available to him.

Significantly, in none of the cases was the person identified as the main contributor to success a family member. Of the 13 participants, three did not identify a person at all. Of the ten who did, two identified individuals not directly associated with the educational system, one identified non-faculty institutional associates, and seven identified teachers that they had had prior to, or at the time of, their enrollment in developmental mathematics. Three of these latter recognized a set of equally important mathematics teachers who were instrumental in carrying them forward at key moments in their college career.

Although they did not speak of particular mathematics teachers, those three participants who identified their own academic background as the key component to their success did, in fact, mention specific early courses—high school geometry and 9<sup>th</sup> grade algebra, for example—which, of course, were taught by somebody. Once they “finally decided to buckle down” or else had their mathematical memories refreshed, they were able to proceed with their academic plans with ease. And this was attributed to the solid background in mathematics that they had been exposed to previously—and presumably to the teachers who taught the courses, at least to some extent.

The opportunities that were identified by participants as being instrumental in their success had to do with specific programs that afforded financial aid (and counseling, in some cases) that acted as supports for their goals. As mentioned, these



were usually tied, in the thoughts of the participants, to the individuals who administered the programs. Nonetheless, access to such opportunities is noteworthy since financial obstacles are a significant reason many adult students do not complete their educations (Quinnan 1997).

The second research question has been partially answered by what has already been addressed. However, it should be emphasized that the impact of faculty and institutional behaviors and attitudes on adult developmental mathematics students cuts both ways. They can be as devastating as they can be encouraging. The significant number of participants who cite the profound impact of a teacher's comments on their success and on their decision to go forward suggests that we should find ways of exploring the impact of teacher comments and behavior on those who did not succeed. Clearly, of the 13 participants in this study, those who most needed to learn the mathematics were those who appeared to most need the affirmations and recommendations of their teachers. Encouraging and affirming comments like Cathi received from her teacher caused her to re-examine and revise her own self-concept—"I thought well, gosh, if she thinks I'm good at math—maybe I'm really good at math." Higbee and Thomas (1999) have shown that "student attitudes toward mathematics and toward themselves as learners are related to achievement. It is sometimes necessary to convince students that they can be successful and are capable of learning mathematics" (p. 12).

This brings us to the third research question which I would like to broach now and then discuss further in the next chapter—What more can be learned about the

educational experiences of the participants that can inform future research and practice? Perhaps the most important thing we can learn is how important these affective factors are to the struggling, insecure developmental mathematics student. Merriam, Caffarella and Baumgartner (2007) have stated the importance to a learner of working through negative feelings, eventually setting them aside, and of retaining and enhancing positive feelings. They have declared, “If the negative feelings are not addressed, what commonly happens is that learning becomes blocked” (p. 165). This, too, has been shown to be the case by recent studies in brain research (Sousa, 2006; Jensen, 2005).

Of the 13 participants, some seemed to place little importance on the developmental mathematics course they took—it was the means by which they reviewed what they had forgotten, but already knew. Their self-efficacy appeared to be quite healthy and they seemed confident that they could have reviewed the material by any number of means—the developmental class being simply one of many. To the majority of the participants, however, the developmental mathematics course(s) and the teacher(s) they had there were quite important. Lessons learned in those courses and from those teachers were carried forward as they themselves became educators. Eileen, for example, tells of how she overcame the rough experience of her first day, some of the lessons learned in developmental mathematics class, and how she carries those lessons with her today:

1       *Eileen Returns to School*

2

3       Um, I went back the next day and I um,

4               went to the Registrar and

5       I told them I had to change sections, and

6               they told me all the math sections were full and

7               I couldn't change, and

8               I almost cried,

9

10       And I told the student worker that was sitting there that

11               I'd had a really bad experience and

12       I had to get out of that class, and

13               I had to take the Developmental, and uh,

14       She kind of leaned forward and said that I,

15               that there were a couple of nice teachers

16               that were teaching at the same time,

17               and that I could ask them if

18               they would let me in their class, and

19               if they would let me in,

20               then I could go.

21

22       So, she, uh, she gave me a couple of names,

23               I don't remember who they both were,

24       but I went to the first one on the list, and—

25               it was, her name was Sally Normandy

26       and uh, she'd already let two or three extra people in,

27               and she didn't want to, I could tell, but she did.

28       She said I could come in, and...and um, she was sweet.

29

30 She was supportive and I did finish early, and—  
31 was able to start on the next semester, and  
32 then ended up getting out of that  
33 semester about half-way through.  
34 So, it freed up time so I could take a heavier load.  
35  
36 I tried to do a good job for Sally Normandy  
37 because she was good to me and very encouraging.  
38 So, she was especially supportive.  
39 And, um, and I met a couple of people—  
40 who were even older than me who struggled a lot,  
41 and I ended up helping them.  
42  
43 There was one red-headed woman—  
44 I can't remember her name,  
45 but I can remember her face, um—  
46 and I would encourage her,  
47 and I would...I would, when I got something—  
48 I would, uh, show her how to do it and—  
49 and that kept me going, too.  
50 It made me feel good.  
51  
52 Well, both teachers, 'cause you know,  
53 I had Sally the first time and  
54 I had somebody else the second semester,  
55 and they were both excellent.  
56  
57 They were respectful of me as a human being—  
58 and as a learner and uh, and—

59                   I did finish early and  
60                   that felt good, but—  
61                   I think the reason I did  
62                   was because  
63       I didn't want to let either one of those teachers down.  
64  
65       And um, and I've always tried to do that  
66                   in my teaching,  
67                   to be...I mean—  
68       I can't do that with a classroom full of people,  
69                   and certainly, when I've got, you know,  
70                   twenty-five freshmen it's difficult.  
71       You know, twenty-five eighteen-year-olds.  
72                   Um, but I try to, and—  
73                   I've always tried to,  
74                   make myself completely available—  
75       lots of office hours and all that kind of thing.

As can be seen from this portion of Eileen's story, she had to muster the wherewithal to go back to school and to try to get a better situation than she had at first. With this second teacher the atmosphere was positive and encouraging, the experience was rewarding, and she began to improve her self-efficacy as both a mathematics learner and a mathematics teacher: "when I got something, I would, uh, show her how to do it and, and that kept me going, too. It made me feel good" (lines 47-50).

There are those who question whether a man can really teach a course in women's studies, and there are those who question whether a Caucasian can really teach a course in black history, but few question the developmental background and experience of those who teach our developmental courses. Do they have the requisite experience to relate to individuals who struggle with self-image and insecurity? Unfortunately, in my experience I have often seen mathematics graduate students (who have seldom struggled with the material in developmental mathematics, nor are they capable of understanding why someone would struggle with it) or professors like Dr. Zero at the beginning of this dissertation placed as teachers of developmental mathematics courses. Who, indeed, makes a better mathematics teacher at the basic and introductory level courses? The results of this study certainly suggest that university mathematics instructors should look for potential mathematics teachers within all their classes, not just from their best students in the higher level courses.

## **CHAPTER V**

### **DISCUSSION AND SUMMARY**

The purpose of this study was to gain a better understanding of the experiences of developmental mathematics students who, after successful completion of their developmental courses, chose a career in teaching, and also to gain a better understanding of how those experiences helped shape their decision to go forward with a career in mathematics education. The research questions that defined and guided the study were:

1. What do former developmental mathematics students, who ultimately chose careers in mathematics education, identify as primary contributors to their success in mathematics and how has their experience in developmental mathematics shaped their career?
2. What impact did faculty/institutional behaviors and attitudes have on these adult developmental mathematics students?
3. What more can be learned about the educational experiences of the participants that can inform future research and practice?

I chose a qualitative methodology in order to better understand the experiences of former developmental mathematics students as they have reflected on them and made meaning of them. With the intention of exploring the text and the context of those experiences, I used narrative analysis—together with both categorization and contextualization.

Portions of the stories told by the participants in the study, together with general results and a number of implications were presented in the previous chapter. I will discuss some

of the main findings in some additional detail here, together with additional implications for future study.

### **Summary of the Findings**

- Some developmental mathematics students have the capacity to become not only competent students but to become outstanding educators and scholars as well.
- Affective components are relevant not only to the developmental mathematics student's role as a learner but in his/her choice of career as an educator.
- For some developmental mathematics students, a sense of self efficacy stems from a relationship and connection with the developmental mathematics teacher more so, even, than with the material being learned. There is a desire to be like the teacher who helped them and to have that kind of impact themselves.
- The narratives revealed that the women overcame especially difficult obstacles, often while carrying heavy responsibilities for children and finances, yet they not only overcame those obstacles, they integrated their triumph into their overall educational experience and into the fabric of their life story.

### **On Developmental Students Becoming Teachers**

Clearly, the former developmental mathematics students in this study are successful, educated, and accomplished. But it was not always so. At some point earlier in their academic careers perhaps someone thought of them as “idiots” as Dr. Zero did of his students back in the first chapter. No one meeting any of them now would think of



them that way nor treat them as anything less than the professionals they are. That seed of success was always there. The key to unlocking their potential in many cases was the connection made with a teacher who encouraged them, respected them, and believed in them. Furthermore, their experience in developmental mathematics makes them ideal candidates for teaching students who are going through the same kinds of struggles.

It is well known that there is a shortage of teachers in mathematics and science. Programs, like the one Jim enrolled in, that are designed to pull new people into the mathematics and science teaching profession, exist at many universities including the University of Texas and Texas A&M. These programs typically want to recruit individuals who already hold degrees in mathematics or science—and that is understandable considering the scope and nature of the programs. However, I am convinced that we, mathematics educators, are overlooking a potential source of mathematics teachers that could prove to be a powerful and effective contingent among the education community by not putting more emphasis on the students in developmental courses.

Some of the participants in this study had experience working in and directing learning centers. Mathematics and science students are provided opportunities to discover teaching if they have the opportunity to participate in peer tutoring via a course (like a developmental course), cooperative study groups (like supplemental instruction), or more formal arrangements such as a paid position in a learning or tutoring center. This is born out by my own observations, and it was confirmed by some of my

participants. One participant, for example, shared a fond memory of a former tutor who worked for her:

*I remember Melissa, the Theater major who tutored...she was such a bright girl, and she was tutoring in two or three different subjects, and uh, she was gonna be a star. Um, now she's a math teacher (laughs). But she, uh, she loved tutoring and she loved tutoring math so much she double-majored, in Math and Theater. And I kept saying, "Melissa, you're a natural. That's what teaching is, you're on stage every time you're in front of a class." And she would kind of laugh, and then eventually she ended up, she got both degrees—but she ended up teaching, and um, and I saw a lot of that from different disciplines.*

And the value of providing opportunity for peer tutoring is confirmed by research as, for example, Lockie and Van Lanen (2008) illustrated in their study of science supplemental instruction (SI) leaders. [Note: Simply put, supplemental instruction involves student-led study groups.] They found the following advantages of the SI experience for the SI leaders:

(a) greater appreciation of the diversity of student learning styles, (b) increased understanding of the subject matter, (c) greater self-confidence as a learner, (d) development of closer relationship with faculty, (e) application of the strategies and skills learned as an SI leader in other courses, and (f) realization of the importance and value of collaborative learning. (p. 2)

It is clear that these advantages are not limited simply to science, but are also applicable to mathematics and other subjects as well. Programs that actively recruit students to be

SI leaders from all levels (including developmental) increase the chances of academic success for all their students and provide opportunity for potential teachers to discover the love of teaching (Wright et al., 2002).

### **The Importance of Affect**

The idea that all students can learn mathematics is supported in part by NCTM's (2000) Equity Principle: *Excellence is mathematics education requires equity—high expectation and strong support for all students* (p. 12). The strong support should include a focused effort to improve the self-efficacy of all students, especially those in developmental mathematics. In a study to determine the difference in self-efficacy between students in a developmental mathematics course and a calculus course Hall and Ponton (2005) found that the calculus students possessed “not only better mathematical skills but also a more powerful sense of self-belief in their ability to succeed in a college mathematics course” (p. 26). This alone is perhaps not surprising, but they also found that students often “lack the ability to identify factors that limit their success” (p. 26). Developmental students often simply do not see the way out of the trap that they are in. The authors go on to recommend that teaching methodologies should be designed specifically for students enrolled in developmental courses in order to not only develop mathematics capability but also a self-awareness of increased capability and furthermore that “efficacy-enhancing instructional strategies should be tested for effectiveness, thereby improving the teaching and learning process for all learners” (p. 26).

When I asked one of the participants who had experience with running a tutoring center about these issues we had the following exchange:

*Gary: It seems clear that our problem, as Developmental educators, is not just the teaching of the material, it involves these attitudes, motivations, and self-efficacy—these other factors—and yet some would say, “Well, they might need remedial courses, but these issues of how to encourage them, or what to do to motivate them, should not be an issue, because it’s just a matter of their own self-discipline, and determination, and love of learning.”*

*Participant: It might be, but um, I, in all the years that I’ve taught, my experience with the young people is that they lose...that our K-12 educational system stamps out all love of learning. Absolutely destroys it for, for most, except for the privileged ones, the ones that go to really good schools and get all kinds of special attention when they’re smart. Uh, most kids feel like the Pink Floyd video, you know, the meat-grinder education? And they’re burnt out, they’re—they’re hollow inside. They don’t have that love of learning, and they don’t realize—they don’t think about learning for learning’s sake. I had gone to, to school thinking, “I’m gonna do this two-year thing so I can get a job.” But, I fell in love with learning, and it became all-consuming. And I know that doesn’t happen to most people, but there’s—there’s not even a—a happy medium for so many of the students that I’ve seen, because they’re so, um, wounded by the time they get to college. So, yeah, teachers kind of have to be inspiring, but see I was wounded when I got to college, too, and I just happened to get, to be lucky. I um, I think we have a responsibility, and the community college teachers have a responsibility to their students to understand that they probably wouldn’t be in a community college if something hadn’t happened to hold them back. It’s socio-economic status, it’s—it’s, you know, getting passed up because they were developmentally slow early on—most kids kind of balance out by seventh grade*

*or so, but—but if you get passed over early on in this tracking system we're in, you're lost, and...and it's—it's rough. So, it's giving them that love of learning that's a responsibility. I know it's a lot of responsibility on teachers, but um, and you know, some kids really don't want it, and never will, and the reasons are...are sad, but um, but I think most people out there just need some...they just need a little inspiration, a little boost in self-image, and a little taste of success.*

Developmental mathematics students need a boost of self-confidence and encouragement as well as the typical coverage of the material—material, it should be noted, that in most cases they have seen many times before. We should ask ourselves what has hindered their learning and assimilation of the material up to this point and how is covering it yet one more time is going to get the job done. We need a different approach! And, frankly, who better to devise such approaches than people like those in this study—former developmental mathematics students who have become mathematics teachers.

### **Student-Teacher Connections**

As this study has shown an encouraging word from a caring teacher can have a tremendous impact on the developmental mathematics student. Similarly, I am convinced that a discouraging word can have a devastating impact. For future investigations I think we should look more closely at the reasons students do not succeed in their developmental mathematics courses. How many of these students have heard a careless, or uncaring, teacher call them “*idiots*” (in word, deed, or gesture) or speak other unkind words about them. I have personally seen it happen far too many times—

students who were not treated, spoken to, or spoken of in a respectful and appropriate way and, then, the following semester they were nowhere to be found. Dropped out, gone. Where are they today? Were they truly just throw-away people? I think not. How many of them could have been excellent mathematics educators like the individuals I have interviewed for this study? The loss is ours—as well as theirs.

This past summer I attended my high school reunion in Copperhill, Tennessee where I was born. Many of my former classmates were amazed as I recounted my story of the impact my 9<sup>th</sup> grade algebra teacher had had on my life. Copperhill was a mining community for many years and my family—my father, my grandfather, uncles and cousins—all worked in the copper mines. It was assumed, at least by me, that I would work there as well once I graduated high school. In keeping with that expectation I signed up for one year of “general math” when I left 8<sup>th</sup> grade (the last year of elementary school, in those days) and entered 9<sup>th</sup> grade (the first year of high school). I was always good with mathematics—at least as good as, or better than, my classmates—and on the first day I scored high on the general mathematics inventory test. The next day Ms. Irene Millsaps met me at the general math classroom door and asked me to take her Algebra I course. I declined. She met me each day for a week as I arrived at that classroom and asked me to try her algebra class—now with the promise that if I didn’t like it, I could go back to general math. I gave in. The algebra class was full—why she wanted still one more student was beyond me. On the first day I was in her class, I vividly recall, she spoke about “the beauty of mathematics.” Most of the students in the class laughed—I did not. I was already hooked. Ms. Millsaps connected with me and

connected me with mathematics in a way no one else ever had before. I did well in her class. I represented our school in the regional mathematics contest that year and placed second. I still have my little medal. Because of that first algebra class I found that other doors of opportunity opened for me. I only had to work in the copper mines during summers, when home from college. I was able to obtain my B.S. and M.S. degrees in mathematics and spend many rewarding years teaching in community colleges and universities. I know firsthand how great the impact can be when a teacher believes in your possibilities.

Most of the participants in this study had at least one teacher who gave them a vote of confidence, a word of encouragement, a key explanation, or a thought-provoking insight at a pivotal moment in their educational experience. The teacher helped facilitate the participant's efforts to effect some affective or cognitive transformation that, in turn, changed everything. But, after all, isn't that what a transformation does? It changes everything. Like Cathi exclaimed: *"That was the first time—yeah—that I ever thought that—EVER. That's exactly what I thought, and I had never had thoughts like that before—ever."* Cathi was moved from a long-held position by simply entertaining the thoughts suggested by her teacher. The words had made an impact on Cathi. They became part of her story and she continues to manage them as key components of her story. She utilizes them in the description of her story and uses them as tools to give her "life events coherence, causality, and purpose" (Rossiter & Clark, 2007, p. 162).

### **Institutional Impacts**

Similarly, institutions may make such indelible impressions upon a student. By this I mean individuals acting on behalf of an institution since an educational institution cannot choose to act of its own accord. However, institutions may have goals and missions that are carried out as intended or there may be institutional climates that are forged in connection or reaction to those who possess such influence. Jim found great assistance both in his discovery of a potential academic pursuit and in obtaining the financial backing to follow through from a state institution, DARS, and from his counselor there, Gina. A number of participants spoke of availing themselves of such support services—financial aid, tutoring services, counseling, and so forth. When there's an attitude of service, however, one is more likely to find individuals who give life, as it were, to the institution allowing for an operational flexibility not explicit in policies, procedures, missions and goals.

Eileen, for example, spoke of a compassionate worker at her institution who alerted her to alternatives to this distressing situation:

*I went back the next day...to the Registrar and...they told me all the math sections were full and I couldn't change, and I almost cried. And I told the student worker that was sitting there that I'd had a really bad experience and I had to get out of that class, and ... she kind of leaned forward and said ... that there were a couple of nice teachers that were teaching at the same time, and that I could ask them if they would let me in their class, and if they would ... then*



*I could go... Her name was Sally Normandy and uh, she'd already let two or three extra people in, and she didn't want to, I could tell, but she did.*

Of course, most who have taught have had to deal with closed sections and know of students who abuse such requests. However, there are those, like Eileen, whose need is legitimate and who make it worth the risk of the occasional add-slip/sob-story mistake. It should be noted here that the institutional rules probably would have forbidden the student-worker to offer that advice to Eileen. As Eileen pointed out, “she leaned forward” and told her quietly—on the side—after telling her the official policy in a normal tone. The implication is that institutional policy should be less rigid for non-traditional, adult, and developmental students. Decisions should be made on an individual basis. Later in Eileen’s interview, she mentioned that “if that student-worker, just a kid really, hadn’t broken the rules and told me to contact a sympathetic instructor, I might, not only not have a Ph.D., but I might still be working for minimum wage with no education. I would not be the person I am now.”

Cathi, on the other hand, not only found a way to affect an institutional response that met her need but brought about an institutional change that benefited many single-mother students on an on-going basis. She tells it this way:

*When I found out—  
—you know I told you—  
that that instructor had dropped me  
from the educational psychology class.  
And then I found out—  
—if I dropped or failed my Calculus One class—*

*I would lose all my financial aid,  
 when I found that out—  
 I got spittin' mad.  
 Because I didn't feel that it was right  
 for that instructor to drop me and  
 the reason I didn't feel that way is because  
 I felt like I had a good excuse for not being there,  
 I wasn't ... just skipping school.  
 My child was sick!  
 And I could have kept up!  
 I knew I could have kept up!  
 I had almost a 4.0 I made a 87 in pre-cal—  
 but in my other classes that semester I made an A  
 and you know so I was like—  
 Give me a break! —you know—  
 My kid's sick!*

*Anyway, I was so spittin' mad that—  
 I went to the dean's office to complain and  
 that dean was gracious enough to let me in her office—  
 the first time I ever met her—  
 And we spoke for an hour and before I left her office  
 she had tears coming down her face—  
 literally,  
 literally,  
 literally—  
 Because I was telling her what I was going through  
 and how hard—  
 —the dean of College Education and Human Development—*

*And when I left her office—*

*She said “I don’t know how  
but I’m going to help you.”*

*She told me that!*

*She said “I don’t know how  
but somehow I’m going to help you.”*

*And by golly that woman instituted a scholarship—*

*—at that College Education and Human Development—  
—specifically for single parents.*

*Three!*

*Three scholarships every year.*

*And I won one of them for three years in a row.*

*But there were two other people who also got them.*

*So to me that was a... a big, big thing because*

*I was the reason the scholarships were created*

*and not only was it helping me*

*but it was helping other people that were in my same situation*

*And that ... that’s an awesome feeling—that—*

*even, you know,*

*down and out as I was, you know,*

*Something happened that helped others... you know...*

*I caused something to happen*

*that helped other people that were having a hard time, too.*

*And that was awesome ...*

Cathi was able to seek help from the dean—the institution. And the institution, in the persona of the dean, responded by creating tangible support for her and others like her.

The response was significant and immediate. And Cathi, as a mathematics instructor, internalized the institution's response and seeks to do what she can for her students in developmental mathematics classes. Too often, in my 35+ years as a mathematics teacher, lofty mission statements and published goals are just window dressing for strict hierarchical power structures and adherence to the status quo. In Cathi's case, however, the dean's actions represent a commitment to students and community commonly cited in mission statements, but rarely enacted by administrations.

### **Why Adults Fail**

In a study of the sources of struggle that adults confront in academic environments Quinnan (1997) assembled the responses into five categories:

1. Economic barriers
2. Internal family stressors
3. Student-to-student tensions
4. Student-teacher strains
5. Organizational obstacles

Each of the participants in this study shared stories that reflected struggles in one or more of these areas. Some, like Jim, were able to find solutions rather easily and seemed have a rather smooth college experience. Others, like Cathi and Eileen, had a very difficult time managing the care of children and securing the finances for living as well as for the expenses of going to college. Of course, they still carry the burden of too much

debt which includes the school loans they had to obtain. Typically, in my study, the women had a much more difficult time than did the men.

Sissel, Hansman and Kasworm (2001) have asserted that “few scholars have pursued sustained research on adults as learners within higher education” (p. 17) and that a majority of college degree-seeking students are over the age of 25. Moreover, women outnumber men in this group. Since most colleges and universities design their policies, programs and missions for the “traditional” student (aged 18-22) these adult college students are left “institutionally invisible, marginalized and taken for granted” (Sissel et al., p. 17).

Many adult educators call for a social action agenda (Quinnan, 1997; Belenky & Stanton, 2000), and we have the opportunity to pursue such an agenda right on our own campuses. Since many nontraditional college students are minorities and first-generation college attendees, (Kasworm, Sandmann, and Sissel, 2000)—including older women and single mothers—they often come from positions of oppression rather than positions of privilege often held by many students in higher education. This offers the possibility of facilitating transformational learning (Mezirow, 1991; Mezirow and Associates, 1990) in this student population and transformational learning “produces more far-reaching changes in the learners than does learning in general, and . . . these changes have a significant impact on the learner’s subsequent experiences” (Clark quoted in Merriam and Brockett, 1997, p. 142).

If “the experience and direction of transformation [varies] according to one’s positionality” (Brooks, 2000, p. 167) the nontraditional, single-mother, college student

provides profound possibilities for educators working for social change. Since transformational learning is, as Clark (1993) suggests, “learning as a change of consciousness” (p. 53), then single-mothers seeking to further their education, and their families’ financial well-being, may be a rich source for promoting future activism and certainly a source of future investigation. The potential to create social awareness and to foster a change of purpose in a large number of college students, especially mothers who in turn would have a profound influence on their own children—and potentially on ours should they become mathematics teachers—should provoke many in adult education to begin focusing much of their research, as well as their practices, on this special population.

### **Suggestions for Future Research**

In conclusion, I would like to itemize here the questions raised at different points in this dissertation for areas warranting further investigation:

- What teaching methodologies are in place that assist developmental mathematics student in not only enhancing their mathematics capability but also a self-awareness of increased capability?
- What efficacy-enhancing instructional strategies exist that could be tested for effectiveness and implemented for improving the teaching and learning process for all learners, especially developmental mathematics students?

- What impact did faculty/institutional behaviors and attitudes have on adult developmental mathematics students who dropped out of their programs and did not complete their college education?
- What can be learned about the higher educational experiences of single mothers especially those who want to enter the teaching profession? How many of them began their college careers in developmental courses?
- What can be learned about the possibilities for teacher recruitment by providing teaching experience via cooperative learning groups, tutoring centers, and supplemental instruction?

I would like to conclude by making a few additional remarks about the methodology in terms of its applicability for future research. Hallyn (1993) has argued that “the epistemology of logical positivism is not really concerned with how theories originate” (p. 8) and that “the establishment of a new hypothesis remains an enigmatic moment” (p. 8). Furthermore, he invokes Thomas Kuhn’s ideas of the paradigm shift “in response to a crisis brought on by anomalies” (p. 9) in order to convince the reader that many times new discoveries first require a change in the institutional and sociological factors that support old ideas. How these anomalies are detected and brought to the attention of researcher is anything but orderly. It is often during times of simple exploration or the unexpected stumbling (the discovery of penicillin comes to mind) or by deliberately engaging one’s imagination in new directions that we find new truth. Gee’s method and other linguistic methods are means for exploration. They are ways for us to arrive at hidden experiences that can inform our teaching. These experiences

require our attention, our consideration, and, at times, our instigation. Choosing to do a qualitative dissertation, particularly using Gee's method of linguistic analysis, was a deliberate action, taken in an effort to acquire a greater range of research experience. The experience has indeed enriched my life and, I believe, helped to make me a better teacher. There is reason to hope, I believe, that further research along these lines can help us, as mathematics educators, produce more teachers and better teachers. Certainly, this study shows that developmental mathematics programs can be successful. They can be responsive to students needs and simultaneously meet their responsibilities to the public. As mentioned in Chapter II (pp. 25-27), research has shown that there are *best practices* that can dramatically improve a developmental program's chances for success. As indicated, it is not a mysterious proposition. We know what to do—we just don't always do it. When we implement the practices that research has shown to work then it is not only the program that is successful. Our students are successful. But it is more than that. This study has shown that some developmental students can not only succeed, they can excel.

Simple things listed among those best practices in Chapter II were evident in the experiences and the stories told by the participants of this study—trained and caring teachers, learning communities, tutoring and counseling, integration of critical thinking, a strong philosophical base, supplemental instruction, and so on. When our educational institutions determine to implement developmental programs that comply with what research has shown actually works, then there will be more students who discover the beauty of mathematics, more students who realize that they can *do* mathematics, and



more students who find within themselves the desire for the greatest payoff of all—the desire to teach.

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## **APPENDIX A**

### **INFORMATION SHEET**

#### Transformation from Developmental Mathematics Student to Mathematics Teacher: Narratives of Adult Learning Experiences

**Introduction**

The purpose of this form is to provide you (as a prospective research study participant) information that may affect your decision as to whether or not to participate in this research.

You have been asked to participate in a research study about the experiences of adult developmental mathematics students. The purpose of this study is to examine the experiences of adult mathematics students and to identify factors that have contributed to their success in mathematics. You were selected to be a possible participant because you have succeeded in a developmental math mathematics course or program and have subsequently chosen to pursue a career in mathematics education.

**What will I be asked to do?**

If you agree to participate in this study, you will be asked to participate in an interview about your mathematics experience. This study will take approximately 30 minutes of your time for the initial interview and a few minutes follow-up at a later date to verify the accuracy of the transcript. Your participation will be audio recorded.

**What are the risks involved in this study?**

The risks associated with this study are minimal, and are no greater than risks ordinarily encountered in daily life.

**What are the possible benefits of this study?**

You will most likely receive no direct benefit from participating in this study; however, results of this study should help improve developmental mathematics instruction, address some issues of academic preparedness, assist in developing more effective teaching/learning strategies, and, hopefully, begin eliminating some of the barriers students sometimes experience in their efforts to obtain a higher education.

**Do I have to participate?**

No. Your participation is voluntary. You may decide not to participate or to withdraw at any time without your current or future relations with Texas A&M University, or any other Texas educational institution, being affected.

**Who will know about my participation in this research study?**

This study is confidential and your responses will be kept confidential. Pseudonyms will be used and any personally identifying characteristics will be withheld. Any indication of your identity will be removed from the text of the study. All paperwork (e.g., consent forms) and other materials (e.g., audio tapes) will be stored in a locked container and will be destroyed in 3 years. The records of this study will be kept private. No identifiers linking you to this study will be included in any sort of report that might be published. If you choose to participate in this study, you will be audio recorded. Any audio recordings will be stored securely. Any recordings will be kept for 3 years and then erased.

**Whom do I contact with questions about the research?**

If you have questions regarding this study, you may contact Gary L. Wright at (210) 458-5640, gwrightmathed@hotmail.com or Dr. Gerald Kulm at (979) 862-4407, gkulm@tamu.edu.

**Whom do I contact about my rights as a research participant?**

This research study has been reviewed by the Human Subjects' Protection Program and/or the Institutional Review Board at Texas A&M University. For research-related problems or questions regarding your rights as a research participant, you can contact these offices at (979) 458-4067 or irb@tamu.edu.

**Participation**

Please be sure you have read the above information, asked questions and received answers to your satisfaction. If you would like to be in the study, contact Gary L. Wright at (210) 458-5640, gwrightmathed@hotmail.com in order to (i) indicate your interest, (ii) obtain and complete the necessary forms, and (iii) set up a time for an interview.

**CONTACT:**

Gary L. Wright  
gwrightmathed@hotmail.com  
gary.wright@utsa.edu

## APPENDIX B

### CONSENT TO TAKE PART IN RESEARCH AS A HUMAN SUBJECT

Texas A&M University

**Title of Project:** Transformation from Developmental Mathematics Student to Mathematics Teacher: Narratives of Adult Learning Experiences

**Principal Investigator:** Gary L. Wright, Ph.D. Candidate

You are being asked to participate in a research study. This form provides you with information about the study. You will also receive a copy of this form to keep for your reference. The Principal Investigator or his/her representative will provide you with any additional information that may be needed and answer any questions you may have. Read the information below and ask questions about anything you do not understand before you decide whether or not to take part. Your participation is entirely voluntary, and you can refuse to participate or withdraw at anytime without penalty or loss of benefits to which you are otherwise entitled.

**Funding Source:** Not applicable.

**What is the purpose of the study?** We are asking you to take part in a study about the experiences of adult developmental mathematics students. We want to learn more about the experiences of adult mathematics students and the factors that have contributed to their success in mathematics. We are asking you to take part in this study because you have succeeded in a developmental mathematics course or program and have subsequently chosen to pursue a career in mathematics education. 15 to 20 subjects are expected to take part in this study.

**What will be done if you agree to take part in this research study?** Participation will involve one interview, with perhaps a follow-up interview, lasting no longer than two hours. The interviews will be audio-taped and transcribed, then sent to you electronically for your verification. This will allow each participant the opportunity to clarify points raised and/or to offer additional information and insight.

**What are the possible discomforts and risks?** None.

**What are the possible benefits to taking part in this research?** You will most likely receive no direct benefit from participating in this study; however, results of this study should help improve developmental mathematics instruction, address some issues of academic preparedness, assist in developing more effective teaching/learning strategies,

and, hopefully, begin eliminating some of the barriers students sometimes experience in their efforts to obtain a higher education.

**Will there be any costs related to the research?** No.

**Will there be any compensation for participation?** No.

**If you do not want to take part in this study, what other options are available to you?** Your participation in this study is entirely voluntary. You are free to refuse to be in the study or to withdraw at any time. You may decide not to participate or to withdraw at any time without your current or future relations with the principal investigator, Texas A&M University, or any other Texas educational institution, being affected.

**How will the privacy and the confidentiality of your research records be protected?**

You can refuse to answer any questions that you do not wish to answer. Your identity will be kept confidential. While some of your comments may be used in the study and later for publication, your name will not be used unless you give written permission. Your identity will be known only by the researcher conducting this interview.

Further, the tape recording of your interview will be kept by the researcher in a secure place and will not be made available to anyone else. The researcher will produce a verbatim transcript of the interview. You may have a copy of the transcript and also have the tape sent to you when the assignment is completed if you so desire. The tapes and transcripts will be kept in a locked cabinet in the researcher's home or office for a period of three years and then destroyed.

The researcher's records will not be released without your consent unless required by law or a court order. Your records may be viewed by the Institutional Review Board, but the confidentiality of your records will be protected to the extent permitted by law. The data resulting from your participation may be used in publications and/or presentations but your identity will not be disclosed.

**Who will know about my participation in this research study?** This study is confidential and your responses will be kept confidential. Pseudonyms will be used and any personally identifying characteristics will be withheld. Any indication of your identity will be removed from the text of the study. All paperwork (e.g., consent forms) and other materials (e.g., audio tapes) will be stored in a locked container and will be destroyed in 3 years. The records of this study will be kept private. No identifiers linking you to this study will be included in any sort of report that might be published. If you choose to participate in this study, you will be audio recorded. Any audio recordings will be stored securely—kept for 3 years and then erased.



**Whom do I contact with questions about the research?** If you have questions regarding this study, you may contact Gary L. Wright at (210) 458-5640, gwrightmathed@hotmail.com or Dr. Gerald Kulm at (979) 862-4407, gkulm@tamu.edu.

**Whom do I contact about my rights as a research participant?** This research study has been reviewed by the Human Subjects' Protection Program and/or the Institutional Review Board at Texas A&M University. For research-related problems or questions regarding your rights as a research participant, you can contact these offices at (979) 458-4067 or irb@tamu.edu.

### **Participation**

Please be sure you have read the above information, asked questions and received answers to your satisfaction. If you would like to participate in the study, contact Gary L. Wright at (210) 458-5640 or gwrightmathed@hotmail.com in order to (i) indicate your interest, (ii) obtain and complete the necessary forms, and (iii) set up a time for an interview.

**Additional Contact Information:** Gary L. Wright  
 Phone: (210) 458-5640  
 Email: gwrightmathed@hotmail.com  
 gary.wright@utsa.edu

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**You have been informed about this study's purpose, procedures, possible benefits and risks. You have been given the opportunity to ask questions before you sign, and you have been told that you can ask other questions at any time.**

**You voluntarily agree to participate in this study. By signing this form, you are not waiving any of your legal rights.**

**You will be given a copy of this form to keep.**

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Printed Name of Subject

---

Signature of Subject

---

Date

---

Printed Name of Person Obtaining Consent

---

Signature of Person Obtaining Consent

## APPENDIX C

### INTERVIEW QUESTIONS

#### Background

Please tell me about your background (education, family, work and career) leading up to the time of your enrollment in developmental mathematics.

#### Experience in Developmental Mathematics

Please tell me about your experience in the developmental mathematics course(s).  
 What factors contributed most significantly to your success in mathematics and to your academic self-confidence?  
 How did you develop the confidence and determination to DO mathematics?  
 How did you develop the academic skills to study and learn mathematics?

#### Support & Inspiration

Please tell me about other sources of encouragement and academic support from role models (either real or fictional) or pop culture.

#### Decision to Teach

Please tell me about your decision to become a mathematics educator.

- What were the most important influences in your decision to teach mathematics?
- Why did you choose a career in education?
- Identify the sources for your confidence & determination to TEACH.

#### Teaching Philosophy

How has your experience with developmental mathematics influenced your philosophy and teaching style. What advice would you give developmental students?

#### Common Obstacles for Adult Learners

Was your journey from developmental student to mathematics teacher made more difficult by having to overcome any of the following?

1. Academic challenges
2. Economic barriers
3. Internal family stressors
4. Student-to-student tensions
5. Student-teacher strains
6. Organizational obstacles
7. Discrimination or prejudices

#### Professional Relationships

Describe your self-confidence when interacting with other (perhaps more experienced) mathematics and education professionals?  
 Are there final comments on doing, teaching, or persisting with mathematics education.

## VITA

Name: Gary L. Wright

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San Antonio, TX 78249

Email: gwrightmathed@hotmail.com or gary.wright@utsa.edu

Education: B.S., Mathematics, The University of Tennessee, 1973  
M.S., Mathematics, The University of Tennessee, 1975  
Ph.D., Mathematics Education, Texas A&M University, 2008

Experience:

2007-Present	Instructor, Interdisciplinary Learning and Teaching University of Texas at San Antonio, San Antonio, TX
1999-2007	Instructor, Mathematics / Interdisciplinary Studies Stephen F. Austin State University, Nacogdoches, TX
1987-1999	Associate Professor, Mathematics Roane State Community College, Oak Ridge, TN
1975-1982	Department Head, Mathematics and Physics Pellissippi State Community College, Knoxville, TN

Presentations:

Wright, G. L. & Wright, R. R. (2007, October). *Spam the class, rock all night and assign the boob-tube—Whatever works!* Paper presented at the 8<sup>th</sup> Annual Curriculum and Pedagogy Conference, Marble Falls, Texas.

“Mastering Developmental Math with a Mentor” given at the College Academic Support Programs Conference in San Antonio, TX, Oct. 19, 2000.

Publications:

Wright, G., Wright, R., & Lamb, C. (2002). Developmental mathematics education and supplemental instruction: Pondering the potential. *Journal of Developmental Education*, 26(1), 30-35.

Wright, G. (2008). Teach 'em to fish: Transitioning from remediation to inspiration—inspiring adults to teach mathematics. In J. Crowther, V. Edwards, V. Galloway, M. Shaw and L. Tett (Eds.), *Whither the adult learning paradigm? Proceedings of the 38<sup>th</sup> Standing Conference on University Teaching and Research in the Education of Adults* (pp. 543-550). Edinburgh, Scotland: SCUTREA.